PAPER TRADE JOURNAL

Reg. U. S. Pat. Off.

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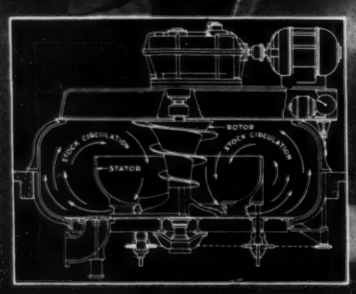

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ESTABLISHED 1872

SIXTY-FIFTH YEAR

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

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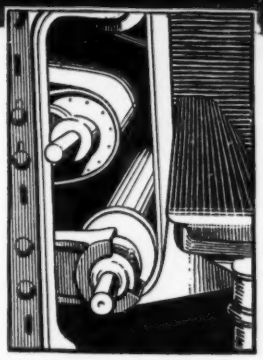

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PAPER TRADE JOURNAL

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PAPER — SIXTY-FIFTH YEAR — PAPER

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Vol. CIII, No. 8 — Thursday, August 20, 1936

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Canadian Mills Adopt "Wait and See" Attitude

Newsprint Paper Executives Delay Following Action of International and Great Northern In Setting Price of $42.50 Delivered for Next Year's Contracts—Hope for Higher Quotation to Meet Increased Costs of Operating

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., August 17, 1936—The announcement by the International Paper Company that it has set a price of $42.50 in respect to its 1937 newsprint contracts has not brought any statement of policy from Canadian newsprint executives here. Informal discussions of this latest development has been held, and it is gathered that there was agreement that a "wait and see" policy is the one to follow in the circumstances.

One paper here hazards the conjecture that Lord Rothermere's suggestion of a $50 a ton price stampeded United States publishers into setting a $42.50 "maximum". They undoubtedly took this sudden action, it says, with a view to forcing the Canadian companies to make only the most nominal increase in price.

Says New Mill Not Competitive

That the huge newsprint mill now under construction on the lower St. Lawrence is not to be in competition with other Canadian newsprint manufacturers is the statement given out by A. A. Schmon, president and general manager of the Ontario Paper Company.

The erection of the mill, he said, will not in any way injure the newsprint industry in Canada or any individual newsprint manufacturers since the enterprise, being a wholly-owned subsidiary of the *Chicago Tribune*, will have its entire output absorbed by that newspaper and its affiliate the *New York Daily News*.

"It should be borne in mind," he said, in this respect, "that the newsprint ultimately to be manufactured by the Manicouagan mill at Baie Comeau in place of the newsprint now being purchased by the *New York Daily News* will not materially affect the sales of existing mills in Quebec. During the past ten years an insignificant proportion of the newsprint purchases by *The News* has been manufactured in Quebec, the major portion of this tonnage coming from mills in the United States and Newfoundland.

"Of even greater interest and importance, is the fact that the *Chicago Tribune* and the *New York Daily News* together will consume in 1938, when the Manicouagan mill goes into operation, approximately 350,000 tons of newsprint per year. The Ontario Paper Company at its Thorold mill produces only 150,000 tons yearly. The production at Baie Comeau will be 100,000 tons per annum. Which means the two affiliated newspapers will continue to purchase approximately 100,000 tons per year from other newsprint companies, a total approximating their outside purchase at the present time. The steady increase in newsprint consumption by these two newspapers means, in effect, that even with the greater Quebec production as a result of the Baie Comeau development, other existing mills located in Quebec or elsewhere will be selling no less newsprint to these newspapers than they are selling at the present time."

Outlay Ultimately To Be $18,000,000

Mr. Schmon confirmed the news that the development will entail within the next two and a half years the expenditure of some $12,000,000—indeed, he said, before 1938 the outlay would involve some $18,000,000.

Asked why the company had decided to go ahead with the development in a remote territory which, on the surface, offered no inducements for large scale developments, Mr. Schmon said the decision had been influenced by a number of considerations.

"First, we had a contract to build a 100-ton pulp mill which was to furnish groundwood for the Thorold mill. This setup was found to be uneconomic. Second, we had entered into an obligation to develop the Manicouagan territory and provide employment for Quebec workers and business for Quebec industrial concerns. We intend to play our part and carry out this obligation. Third, we have pioneered in the gulf north shore. Throughout the depression, when we could have obtained our newsprint elsewhere at lower cost, we made economic sacrifices in order to provide work and wages and keep faith with the Quebec workmen in our employ. Finally, we considered Quebec the safest place in the world for capital investment.

"As a Canadian company we had a large stake in this Dominion and in this province. We have faith in the future of Canada and for our part are prepared to establish solid industries in this country and province that will benefit all classes of people. Our investment at Baie Comeau will, before the end of 1938, total some $18,000,000. Practically all this money we have spent in the Province of Quebec. After 1938 we will provide steady employment to hundreds of Quebec workers and continue to make large purchases within the province."

International Paper Shows Profit of $665,216

Showing for Second Quarter This Year Compares With a Loss of $865,415 for Second Quarter of Last Year—Net Profit for First Six Months of This Year Was $262,542 as Compared with a Loss of $1,934,410 for Last Year

Richard J. Cullen, president, in submitting the statement of consolidated profit and loss of International Paper and Power Company and subsidiary companies (excluding International Hydro-Electric System and its subsidiaries) for the second quarter and first six months of 1936 together with comparative figures for the corresponding periods of 1935, says:

With both prices and physical volume of business in most grades of paper continuing at levels above last year, operations for the second quarter resulted in a net profit of $665,216 as compared to a loss of $865,415 in the second quarter of 1935. Net profit for the first six months this year was $262,542 as compared with a loss of $1,934,410 last year.

The companies have heretofore charged to maintenance and repairs the cost of replacement of units of property, except that portion of major replacements representing an increase or improvement in plant capacity. During the second quarter of 1936, the companies changed this policy to the more generally accepted practice of charging to depreciation reserve that portion of the cost of property replaced for which depreciation reserve had been provided in previous periods and charging to maintenance and repairs an amount equivalent to the remainder. The adjustment to reflect this change of policy for the first quarter of 1936 was recorded in the second quarter, thereby resulting in an increase of approximately $145,000 in the net profit shown for the second quarter. Total charges to maintenance and repairs for the six months ended June 30, 1936 were $3,339,151 compared to $2,790,233 for the same period in 1935.

In addition to provision for normal income tax, there has been reserved out of earnings for the second quarter $318,226 to cover the possible payment of tax on undistributed profits for the first six months as International Paper and Power Company and International Paper Company are not currently in a position to pay dividends.

On August 4, 1936, International Paper Company and its subsidiary, Southern Kraft Corporation, completed payment of their entire current bank debt as a result of the recent sale by Southern Kraft Corporation of $14,500,000 First Leasehold and General Mortgage Bonds, 4¼ per cent Series due 1946. At the present time, except for $674,000 owed by Canadian and Newfoundland subsidiaries, neither International Paper Company nor any subsidiary company has any indebtedness to banks on current account.

INTERNATIONAL PAPER AND POWER COMPANY AND SUBSIDIARY COMPANIES
(Excluding International Hydro-Electric System and Subsidiaries)
Statement of Consolidated Profit and Loss

	Quarter Ended June 30, 1936	Quarter Ended June 30, 1935	Six Months Ended June 30, 1936	Six Months Ended June 30, 1935
SALES AND OTHER INCOME:				
Gross sales, less returns, allowances and discounts	$27,423,625.06	$23,469,841.26	$52,943,960.91	$45,956,989.54
Other income—net	330,145.25	356,984.04	559,949.21	645,008.12
	$27,753,770.31	$23,826,825.30	$53,503,910.12	$46,601,997.66
COST AND EXPENSES:				
Cost of sales:				
Pulpwood, labor, materials, etc.	$16,243,288.33	$14,222,538.67	$32,066,208.10	$28,081,871.97
Maintenance and repairs	1,620,484.57	1,431,526.06	3,339,151.28	2,790,232.89
Taxes (other than income taxes)	518,827.33	494,344.39	1,032,649.30	982,803.09
Outward freight and delivery expenses	3,705,089.50	3,243,029.74	7,251,413.72	6,298,633.49
Selling, general and administrative expenses	1,466,876.77	2,036,475.65	2,966,933.64	3,877,365.58
Provision for doubtful accounts	155,509.23	186,493.39	312,323.76	343,402.48
	$23,710,075.73	21,614,407.90	46,968,679.80	42,374,309.50
	$4,043,694.58	$2,212,417.40	$6,535,230.32	$4,227,688.16
DEDUCTIONS:				
Interest on funded debt	$916,435.41	$980,253.25	$1,838,155.17	$1,963,843.20
Interest on other debt	187,341.53	224,348.21	421,306.55	451,094.85
Amortization of debt discount and expense	87,432.08	97,232.68	173,180.10	194,465.32
Depreciation	1,284,795.86	1,330,675.14	2,458,820.30	2,647,017.26
Depletion	187,005.67	211,134.40	354,898.80	398,471.27
Provision for income taxes	222,614.66	66,815.00	353,779.66	162,783.00
Provision for federal undistributed profits tax	318,226.00	.....	318,226.00	.....
Dividends accrued but not being currently paid on preferred stocks of subsidiaries	174,626.55	167,373.44	354,321.11	344,423.90
	$3,378,477.76	3,077,832.12	6,272,687.69	6,162,098.80
NET PROFIT OR LOSS	$665,216.82	$865,414.72*	$262,542.63	$1,934,410.64*
		* Loss		* Loss

In the above consolidated financial statements foreign accounts are stated on the basis of $4.85 for the pound Sterling and at parity of exchange for Canadian and Newfoundland currencies without adjustment of differences. It is the practice of the companies to reflect in current operations any differences between these rates and the current quotations at the time funds are actually purchased or transferred.

In the above figures for 1935 certain items amounting to $158,075 for the quarter and $296,553 for the six months ended June 30, 1935, were included under selling expenses, whereas in 1936 the corresponding items are deducted from gross sales. This change in classification does not affect the net results.

Unpaid cumulative dividends on 7% and 6% cumulative preferred stocks of International Paper and Power Company for the period from April 15, 1931 to June 30, 1936 amount respectively to $32,939,046.88 and $113,906.25 or a total of $33,052,953.13.

The above statements are subject to final adjustment at December 31st (end of fiscal year).

May Start Pulp Mill at New Westminster

VANCOUVER, B. C., August 15, 1936—Possible establishment of a new pulp mill at New Westminster, B. C., is reported following the securing of an option on the Brunette mills property at New Westminster, B. C. from L. A. Lewis by H. L. Edmonds, K. C., for undisclosed principals.

The option is effective until December 31 and involves over 90 acres of property and about a mile of waterfront. On the property is a sawmill, planing mill, shingle mill, and various other plant units, which with the exception of the shingle mill have been disused for some years. It is understood that if the option is closed the plant will be remodelled and brought up to date and that the ultimate intention of the new owners will be to establish a pulp plant.

St. Regis Speeds Work on Tacoma Mill

Big Plant at Tacoma Which Has Been Idle for Some Years Is Rapidly Being Reconstructed Into An Up-to-Date Unit for Manufacture of Higher Grades of Bleached Kraft Pulp—Two Shifts Employed as Work is Speeded

TACOMA, WASH., August 15, 1936—"Full speed ahead" is the signal in the engineroom of the St. Regis Kraft Company's Tacoma pulp plant on the tideflats. There were 75 men at work last week on the new and reconstruction work now just getting under way in earnest, after a couple months' delay. There was word from the engineering department of new contracts let for additional units of the program that will transform the plant into the latest type of bleached kraft pulp factory.

Two shifts are being employed on the reconstruction work as it is now being speeded up. All the men employed, about half of whom are skilled workers, are Tacoma residents, it is stated. Even the technical crew of seven engineers has been recruited locally. A rapid increase in the force of workers is anticipated from this time forward until all parts of the project are under way.

To Cost $1,000,000

The transformation of the big pulp plant into one to supply the growing market for the higher grades of bleached kraft pulp is going to be an undertaking of magnitude, involving the expenditure of a sum reported to be in the neighborhood of $1,000,000. Even though the plant was built only eight years ago, the progress in pulp manufacture processes has been so rapid that large units of the plant must now be discarded as obsolete, and completely replaced. Other major changes are required by the technique of producing a bleached pulp instead of the brown kraft that goes into the ordinary wrapping papers and bags of commerce.

The driers of the old plant have already been ripped out and their concrete foundations are being broken out. The old driers allowed too much dirt to get into the pulp for making bleached stuff, and besides, they have been superseded by new types where the sheets of pulp can be dried in hot air chambers in much shorter time. The old boilers of the plant are also out, to make way for more efficient ones which will also burn hogged fuel, but at less cost for steam. There are to be two of the new type driers and three 825 horsepower boilers.

Using 27 Acres

The 27-acre site will be practically entirely utilized when the new plant is ready for operation some time around the end of this year. A new reinforced concrete and brick building of about 85 by 250 feet dimensions, three stories high, for the bleaching department, will fill in one strip. At the north waterfront end a big dock for ocean steamers, 80 feet wide by 640 feet long, all covered and equipped for economically handling pulp for storage and shipment, will extend into the bay, alongside the west guide wall at the mouth of the Puyallup river.

Also at the north end will be a new sawmill and chipping plant, to take hemlock logs from rafts in the bay and prepare the wood for the digesters of the pulp plant proper. The old plant received slabs from the hemlock mill of the St. Paul & Tacoma Lumber Company, which will not again supply raw material. Some hemlock will be received in the form of cord wood trucked in, but the major part will come as rafted logs. At the south end of the site will be several large filter tanks for filtering city water, to insure absolute purity for the bleaching processes. Yesterday a new planked roadway leading into the site from Sitcum Avenue was being completed. A steel and wire mesh fence has been built entirely around the site.

The Hart Construction Company of Tacoma has received the contract for the construction of the big ocean dock. It calls for creosoted piling and the best construction throughout. The Tacoma Dredging Company will take out about 200,000 cubic yards of silt to provide the proper depth of water about the dock. One of the expensive items of the plant equipment, the screens, have been ordered from Pacific Northwest manufacturers.

Fortunately some of the expensive equipment of the old plant was so advanced when installed that the units are still the best available for their purposes. Five big recovery units, will need no special alteration. These important units each produce 500 horsepower of steam as a by-product. Even with this power and all the waste from the sawmill, burned under boilers, the plant will have to buy 20 per cent more hogged fuel, to the advantage of Tacoma lumber mills.

Miles of Pipe Work

Along with all the other elaborate modifications that must be made to prepare the plant for making bleached craft, must be undertaken the disassembly of all the many miles of piping of the plant, to see that it is all in condition to deliver liquids without dirt or contamination, chemical or otherwise, when reinstalled. This will mean a big job for many Tacoma pipe fitters.

The bleached kraft will go by water practically exclusively to paper mills of the St. Regis company on the Atlantic coast. There is a crying demand for white paper bags for sugar and flour containers, replacing cloth bags. Kraft pulp gives the needed strength for such bags in reasonable weights of paper. Numerous other demands for bleached paper with the strength of Kraft are also accumulating, it is reported.

Bids for Government Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 19, 1936—The Government Printing Office has received the following bids for 3,000 pounds of No. 1 gummed kraft paper; Royal Card and Paper Company, at 7.9 cents per pound; Mathers-Lamm Paper Company, 6.86 cents; Whitaker Paper Company, 7 cents less 3 per cent; Walker-Goulard-Plehn Company, 7.5 cents; United Supply Company, 6.5 cents less 2 per cent; Reese & Reese, Inc., 7.07 cents; Resolute Paper Products Corporation, 7 cents less 2 per cent; and Enterprise Paper Company, 6.93 cents less 2 per cent.

Hinde & Dauch Increase Profit

The Hinde & Dauch Paper Company for the six months ended June 30 reports net income of $568,365 after depreciation and other charges compared with $543,001 for the same period in 1935.

Paper Demand Increases Slightly in Chicago

Usual Midsummer Slump Less Serious Than Generally Anticipated—Various Grades of Fine Paper in Better Request—Kraft Paper Market Exhibiting Strong Undertone—Some Improvement also Noticed in Paper Stock

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., August 17, 1936—There are definite indications that Chicago is going to escape its annual summer slump without any serious consequences. There is plenty of evidence to the effect that the slump is going to be much less serious than some had anticipated. As August begins its last two weeks mills in most lines report fairly strong activity and though the volume is by no means of impressive proportions it is, nevertheless, decidedly encouraging. An actual slight pick-up was registered locally, in the midst of the "dog days".

Specifically, the kraft market continued to move along in encouraging proportions with the underlying strength easily discernible. Cardboard prices evidenced the upward trend in this market, while blottings also gave evidence of improved conditions. Book stocks were better, with coated grades reported as noticeably so. Rag papers gave a good account of themselves during the week, while the fine paper line in general evidenced slight improvement during the last six days. Groundwoods were said to be in a satisfactory position and the newsprint market conditions are considered generally encouraging.

Good Demand for Fiber Making Equipment

A local business concern, the Fibre Making Processes, Inc., has reported a number of impressive sales during the past few weeks. The corporation, located in the Tribune Tower, lists the sale of two barking drums and one washing drum to the Crown-Williamette Paper Company, Oregon; one F.M.P. circulating system to the St. Regis Paper Company, New York; six F.M.P. circulating and indirect heating systems and one chip beater to the Texas mills of the Champion Paper and Fibre Company; two barking drums to the Ontario Paper Company, Quebec and two F.M.P. systems to the Great Northern Paper Company.

News of the Industry

While the move is still shrouded in some mystery, the fact remains that the Crown Zellerbach Corporation has taken another big step in the national development of its sulphite paper business through the acquisition of the Midland Paper Company, 560 West Lake street, Chicago. The news has been common talk with the local industry though exact details are still not available. H. B. Todd, for twenty years identified with the paper industry and recently vice-president and general manager of the Lincoln Paper Company, is the manager of the Zellerbach Chicago interests. No official statement has been made as to the positions of W. J. Opfer and G. A. Meuller, general manager, both Midland executives who have helped to maintain the excellent 27 year record of the Chicago concern. Conversation indicates that the Midland sales force is likely to be retained although materially augmented as the Zellerbach interests begin to intensively develop the midwestern territory. It is also believed that the executives of the Midland organization will also be retained. That Zellerbach becomes an important factor in the Chicago and midwest market with the intention of furthering its development of the entire midwest market is the conviction of local paper executives.

The Midland organization has a most excellent record over a period of many years. It was last in the news last winter when a disastrous fire virtually destroyed the concern. However, Midland moved to a new location on West Lake street and did what the trade considered a most commendable job in reviving its interests.

William Bond Wheelright, prominent in the promoting of paper exhibits at the second edition of Chicago's World's Fair and author on paper subjects, is at Harvard University Summer School taking courses in Chinese and Japanese art. Mr. Wheelwright's wife is also attending the sessions. He has arranged a paper exhibit for Harvard University, the exhibit featuring a comprehensive display of writing and printing papers and important historic specimens. It is reported that his book "Printing Papers", which will incorporate several of his articles which have been released within the past year, is to be published in the near future by the University of Chicago press.

Local distributors are finding the Chicago trade quite interested in the new Whiting-Plover Buying Guide issued by the Stevens Point manufacturers. Three kinds of writing paper are reviewed in the "guide" including bond, ledger and onion skin and the permanence and strength of all three are stressed in the interesting publication. The booklet, of 24 pages, explains how rag-content papers are made and otherwise offers educational material which is much appreciated by local buyers.

The Midwest Division of the Salesmen's Association of the Paper Industry will hold its semi-final golf outing on August 21 with the Westmoreland Country Club as the site for the luncheon, golf and dinner events. The final outing is slated for some time in September and will again be staged as part and parcel of the Fall Meeting of the National Paper Trade Association.

A Chicago concern, the Mid-States Gummed Paper Company, has recently published two pamphlets on "Green Core Gummed Cloth Tapes" and on "Solving That 'Joint' Problem". The former booklet features Mid-States' entire line of box tapes and is a good reference guide and workable visible sales aid. The latter booklet gives interesting information on the use of Sisal box tape.

W. R. Lusignea with Paper Mfrs. Co., Inc.

W. R. Lusignea until recently manager of flat gummed papers and specialties at the Gummed Products Company of Troy, Ohio, which position he resigned on June 1, has been appointed director of sales and research for the Gummed Paper Division of The Paper Manufacturers Company Inc., Philadelphia, Pa.

This company is just completing an addition to its buildings and equipment which will greatly increase its capacity. It has been in business for 33 years and is manufacturing a line of flat gummed papers in which it has specialized and which has made an enviable record in popularity during the past two years.

Mr. Lusignea, whose ability and esteem rank high in the paper trade, brings to his new associates a wealth of experience in the gumming industry in which he has been engaged for 31 years.

Celebrate New Union Bag Plant Opening Oct. 1

Governors of Five Southeastern States, Prominent Figures in New York Banking, City Officials and Officers and Directors of the Company to be Present at Elaborate Opening of the New Kraft Mill at Savannah, Ga.

Plans for a mammoth civic celebration in Savannah October 1 to dedicate the $4,000,000 plant of the Union Bag and Paper Corporation of Georgia were announced last week says the *News* of Savannah, Ga.

Civic leaders said the event, celebrating the establishment of the huge new industry here, would be one of the greatest of its kind ever staged in the Southeast.

Citizens of Savannah, jubilant at the establishment of the huge industrial plant here, will have added reason for joy at the October event.

To Build Additional Unit

The corporation announced recently it would build another unit here, costing approximately $2,750,000, which will more than double the productive capacity of the present mill. Most contracts for the new unit already have been awarded and work on it is now getting under way. The first unit already is complete and production has begun.

Governors of five Southeastern states, prominent figures in the New York banking industry, officers and directors of Union Bag and Paper Corporation, and other outstanding business men of New York and Georgia have been invited.

The celebration will mark the official public inspection of the corporation's tremendous properties here. Civic leaders of Savannah, noted for their hospitality and civic enterprise, said they planned to marshal the resources of the entire community to make the occasion a memorable one. There is a likelihood that many of the city's business enterprises will shut down on the day of the celebration to add to the success of the event, and to give as many citizens as possible an opportunity to get a first-hand, behind-the-scenes picture of the giant new industry.

William O. Rogers, Jr., head of Union Bag's sales promotion department, has been in the city for more than a week aiding civic leaders in making preparations for the celebration.

Elaborate Plans by City of Savannah

Elaborate plans have been made by the city of Savannah, the Savannah Industrial Committee and the Savannah Port Authority, for entertainment of out-of-town visitors. The official inspection of the plant will be made at 10 o'clock in the morning. Immediately thereafter, the mill will be opened to the public generally. Guides will be provided, and company officials invite all interested Georgians to take advantage of the opportunity to visit one of the nation's most modern pulp and paper plants.

The out-of-town guests, and the Savannah committee, will be entertained at luncheon by the paper firm. During the afternoon, the official party will be shown points of interest in Savannah and vicinity.

In the evening, there will be a dinner given under auspices of the Industrial Committee of Savannah, and the Savannah Port Authority. It is expected that there will be about 600 in attendance. At the conclusion of the dinner, brief addresses will be made by some of the prominent guests and by Union Bag officials.

The official party will be entertained Friday by the city, and will leave Friday night.

The Union Bag and Paper Corporation of Georgia, a wholly-owned subsidiary of Union Bag and Paper Corporation, completed the first unit of its plant here this year. It manufactures kraft paper and paper bags.

Fourteen Departmental Units

The plant itself is a series of fourteen departmental buildings, all connected, and each having a part in the process whereby slash pine goes into the plant as logs and comes out as a finished product.

The first unit was built to produce 135 tons a day of kraft pulp and 125 tons a day of paper. The major portion of this production will be consumed in the company's Savannah paper bag factory. Here paper bags will be manufactured, when the plant gets into full-speed operation, at a maximum capacity of about 12,000,000 bags a day. The bags will be made and printed for retail dealers of Georgia and surrounding states.

Operation of the first unit alone, plant officials said, means the payment in cash to Georgia citizens of almost $1,500,000 annually for payrolls and wood purchases. Nearly 2,000 persons will be employed in the manufacturing process, from timberlands to bag factory.

Plant officials said many factors combined to influence selection of Savannah over a number of other locations as the site for the plant. In addition to natural advantages of adequate rail and water transportation, availability of timber from millions of acres of timberlands within economical hauling distance, and wholehearted co-operation of city authorities, the Industrial Committee, the Port Authority and local bankers made Savannah the ideal site, officials said.

Ample Supply of Wood

A supply of wood far in excess of any anticipated demand was one of the important factors, one official said.

Although the corporation itself has tremendous holdings of timberlands, it announced some time ago that it would, in an effort to give Georgia farmers added cash income, buy wood from them whenever possible.

The raw material used in the plant is slash pine—the natural product of Southern forests. The company already has made contracts providing an outlet for pine growing on privately-owned farm lands.

Company officials already have begun to stress the importance of forest conservation and the company on its own holdings has made elaborate precautions to prevent fires and other sources of damage or waste of timber. Of particular interest to Southeast Georgia is the fact that pulpwood can be obtained from trees which have been tapped by naval stores operators.

Committee of Distinguished Citizens

A committee of distinguished citizens of Savannah is in charge of arrangements for the celebration. The committee is composed of Howard C. Foss, chairman of the Industrial Committee of Savannah; Robert W. Groves, president of the Savannah Port Authority; Mayor Thomas Gamble; Chairman Arthur W. Solomon of the Chatham County Commission; Herschel V. Jenkins, president and editor of the Savannah *Morning News* and the Savannah *Evening Press;* William Murphey, president

of the Citizens and Southern National Bank, and Colonel E. George Butler, chairman of the Industrial Committee of Savannah and secretary of the Port Authority.

In addition to the Governors of Georgia, Florida, Alabama, North Carolina and South Carolina, Francis Garvan of the Chemical Foundation, New York; Clark Howell, editor and president of the Atlanta *Constitution* and long an advocate of development of the paper industry in the South, and other prominent figures have been invited to the celebration.

Officers of the Company

Officers and directors of the Union Bag and Paper Corporations, of Georgia and New York, have been invited. They are:

Union Bag and Paper Corporation, Alexander Calder, president; H. S. Daniels, T. M. Avery and John Wohnseidler, vice presidents; P. E. Bonin, treasurer; S. H. Brown, secretary. Directors, August Heckscher, chairman; Alexander Calder, H. S. Daniels, Albert Newcombe, Homer A. Vilas, Leroy W. Campbell, William S. Kies and Thomas M. Day, all of New York, and William Murphey, Savannah.

Directors of Union Bag and Paper Corporation of Georgia are: Alexander Calder, John Wohnseidler, H. Stuart Daniels, Lindsay Goeltz and Albert Newcombe, all of New York; and William Murphey and J. H. Allen of Savannah.

Construction of the first unit of the plant was begun more than a year ago on the 370-acre tract which formerly was the historic Hermitage plantation. The plant is built in the shape of an L, with the bag factory as one arm, some 525 feet long, and the pulp and paper mill stretching out over a quarter of a mile at right angles to the bag plant.

There are nearly three miles of railway trackage serving the plant and its yards, and docking facilities adjoining the plant. The factory is on the Savannah river.

Features Burn-Out-Protected Insulation

A new motor-driven, single operator type arc welder for general fabrication and repair work has been developed by The Lincoln Electric Company, Cleveland, Ohio. This machine, designated as the "SA-150," with a rated current range of 45 to 200 amperes, is intended for a wide variety of applications. These include sheet metal work, hard-facing of many types, pipe welding, cast iron repair, fit-up and auxiliary work in shops where heavy welding predominates, regular production welding involving steel, alloy and non-ferrous plates and shapes. It can be used with either bare or shielded arc type electrodes.

It is claimed the utility of this new welder is further broadened by the fact that, at the proper points, the machine is insulated with Class B insulation. Having no inflammable materials, such as cotton, fiber, wood or bakelite, this insulation is insured against burn outs, permitting sustained overloads without injurious effect. It is said that some shops are using it with electrodes as heavy as ¼ inch.

The welder has dual control of voltage and current, allowing independent adjustment of arc heat and arc penetration to suit the welding application.

The "SA-150" is powered by a "Linc-Weld" 7½ hp. A. C. motor and is available for 60 cycle power circuits of 220 or 440 volts, three or two phase. Either portable or stationary models can be supplied at the lowest price ever set on machines of this type. Net weight of stationary model is 425 lbs. The welder occupies a floor space of less than two feet square.

Boston Paper Industry News

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., August 17, 1936—Percy D. Wells has issued a new catalog and price list containing 60 pages and a swatch of Franconia 100 per cent American Bond, including white and twelve colors, manufactured by the Parker-Young Company, Lincoln, N. H. Each sheet of the swatch contains information. The sheets are as follows: White, illustrated by players on a baseball diamond, figurative of the value of Franconia Bonds, with notes on this paper; primrose, with 1936 calendar; green, a table showing words and letters to pica lengths; pink, envelope sizes and cutting scale; canary, colored ink mixing chart; blue, postal rates, first to third classes; buff, parcel post rates, fourth class; salmon, proof readers correction marks; café, weight calculator for special sizes; goldenrod, cutting chart, book papers; gray, table of bond paper—Substance Nos.; russet, table of book paper Substance Nos. and ply thicknesses; and cherry, packing carton table. The booklet contains also a table showing how to figure profit. The paper used is Franconia 100 per cent American Bond Cherry—Substance 20. The cover is of scarlet Bessemer Bristol, embossed. Bessemer Bristol is made in white and black and the following colors: Light blue, gold, dark gray, dark green, ivory, orange, dark blue, yellow, light gray, light green, tan, and scarlet.

Knight, Allen & Clark, Inc., are distributing a new Super-Nurex Dispenser to old and new customers on this product. This offering has recently been made by the manufacturers of Super-Nurex, the Lee Hardware Company, Salina, Kansas. This product is a padding compound, used for blocks of paper and bookbinding. A recent use of the product is for sealing the edges of a molder instead of gummed seals, resulting in considerable saving in both labor and material.

Lewis C. Bills, president of the Kendall Paper Company, Cambridge, Mass., left today on an extensive business and pleasure trip to the Middle West, where he will visit manufacturers whom his company represents.

Australia Prohibits Some Paper Products

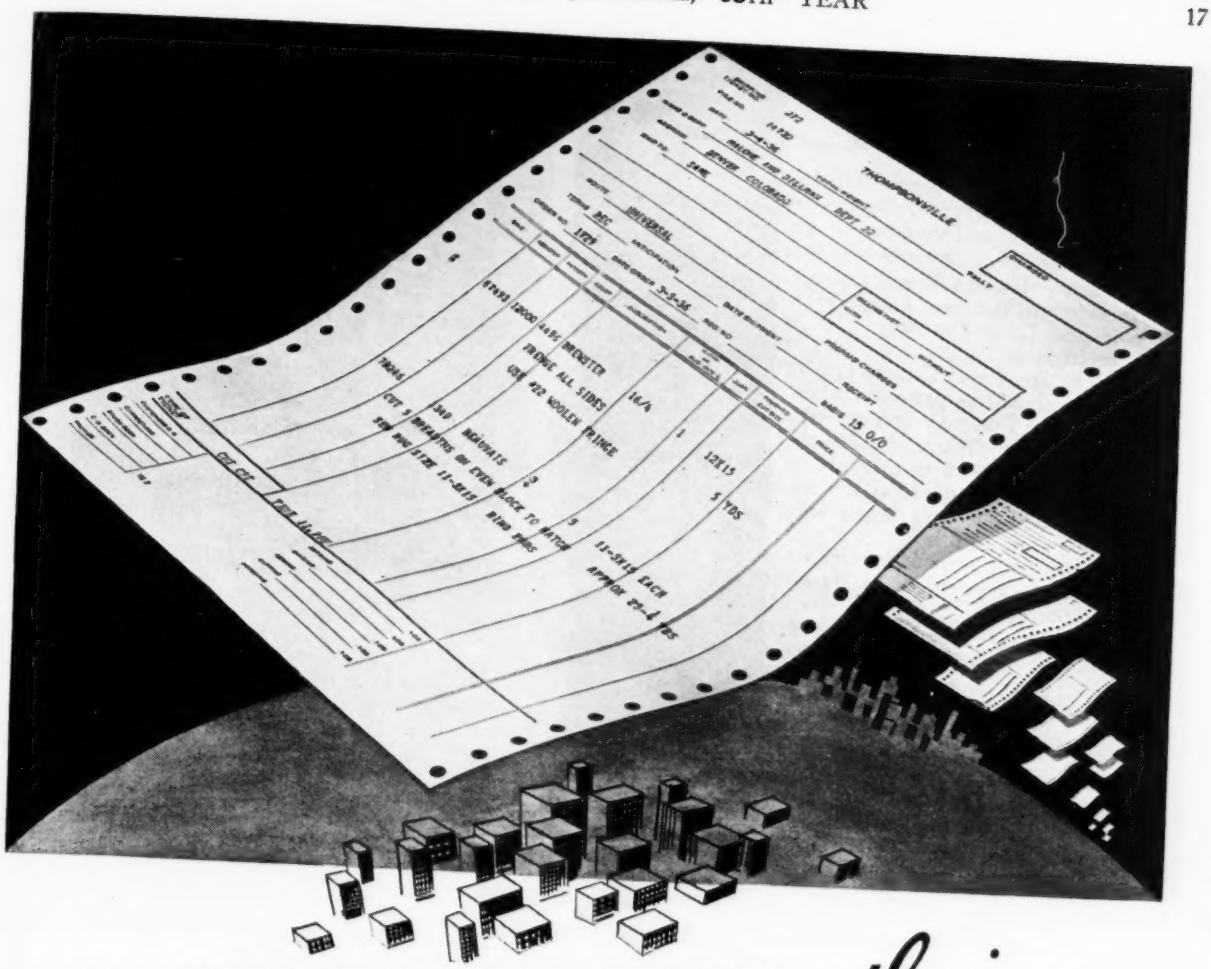
[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 19, 1936—Importations of certain paper products into Australia are prohibited according to a report from Assistant Trade Commissioner Wilson C. Flake.

Wall board, and certain types of paper are included in the list of products the importation of which from non British countries has been prohibited except with the written consent of the Minister for Trade and Customs.

The new regulations are part of the government's plan to reduce imports from those countries, notably the United States, with which Australia has a greatly adverse trade balance. This will be effected by a licensing system; permits will be granted freely for imports from "good customer countries" while it is understood that permits will be granted rarely, if at all, for imports from other countries, which includes the United States.

The position with regard to wall board is somewhat obscure. Aside from the two American boards on the market, there are two others which have been imported into Australia; one is from Canada, and no permit is necessary to import from that source. The other board is imported from Finland, with which Australia has a heavily adverse trade balance; and it is not yet definitely known whether permits will be granted for imports from Finland. Importers of the American boards have been refused permits.



BELL SYSTEM KEEPS ORDERS *flying* FOR BIGELOW-SANFORD *carpet*

IN 1934, Bigelow-Sanford executives and Bell System representatives collaborated on a study of the company's communication requirements, in an effort to improve efficiency and effect economies. They found frequent congestion in the handling of rush orders and inquiries between New York City headquarters and the plant at Thompsonville, Connecticut.

Result was the installation of Private Line Teletypewriter Service between the two points. Now, shipping tickets *typed once* in New York are instantly, identically reproduced at the mill, with all necessary copies. No time lost. No recopying. Orders flow smoothly without peaks or pile-ups. Inquiries and replies are written and accurate — responsibility is definitely fixed. Hours of clerical labor have been saved. *And a large percentage of all orders are delivered to customers one day sooner.*

● Experienced Bell System representatives will carefully review *your* business *with you* to see whether operating economies or improvements can be effected by modern communication methods. No charge, no obligation. Just call the nearest office of your local Bell telephone company.

AMERICAN TELEPHONE & TELEGRAPH CO. AND ASSOCIATED COMPANIES — BELL SYSTEM

Obituary

Edward Holt Morris

PHILADELPHIA, Pa., August 17, 1936—Edward Holt Morris, head of the largest felt-paper manufacturing concern in the world, and member of an old Philadelphia family, died last week at his home, 54th street and Wynnefield avenue. He was 76 years of age.

As president of the John Lang Paper Company, and its successor, the Lang Company, Mr. Morris was widely known throughout the country. In 1901 he became head of the John Lang Paper Company, which was founded in 1873, and continued as president when the old firm gave way to the Lang Company and moved its plant from 24th and Vine streets to Gloucester City, N. J.

Mr. Morris was born in this city in 1860, the son of Henry F. and Alice H. Morris. As a young man he studied medicine, but later began his business career in the flour and feed business.

For about fifteen years Mr. Morris was engaged in the manufacture of carpet yarns in Manayunk. He gave up this connection when he became president of the John Lang Company. He was also vice president and director of the Ruberoid Company, of New York, and a director of the Warren-Ehret Company, of Philadelphia.

Mr. Morris was a member of the Union League, Philadelphia Country Club, Kindergarten Club, the Thousand Islands Country Club, Philadelphia Bourse and the Grenadier Country Club in Canada. He was a Mason. He was a governor of the Thousand Islands Yacht Club and the last survivor of the Thirteen Club, organized in 1889. His summer home was at Alexandria Bay, N. Y.

His first wife was Miss Viola Lang, daughter of John Lang. She died in 1901, and three years later he married Miss Hallie Stevenson, who survives. Also surviving are his son, Edward H. Morris, Jr.; a daughter, Miss Hallie Morris, and two brothers, Harry F. Morris, Jr., and John F. L. Morris.

Philip H. Baker

ST. LOUIS, Mo., August 17, 1936—Philip H. Baker, president-treasurer of the Baker Paper Company and his wife were killed in an automobile accident last week.

The accident occurred on Highway 61, on a straight stretch of road, when the automobile ran off the highway and struck a tree. Coroner W. Harry Barron of Madison County, said he thought that Mr. Baker, who was 72, fainted and lost control of the car.

Mr. Baker had been in the paper business since he was seventeen years old. He was formerly connected with the Seaman Paper Company, but twelve years ago founded the company which bears his name with his son, Roscoe G. Baker, of 7262 Westmoreland avenue. The company office is at 606 South Seventh street.

Edwin L. Weesner

[FROM OUR REGULAR CORRESPONDENT]

MARION, Ind., August 17, 1936—An illness of several months duration resulted in the death of Edwin L. Weesner, age seventy, wealthy Marion industrial leader. Death occurred at his summer home at Lake Wawasee.

Mr. Weesner founded the Osborn Paper Company along with George A. Osborn and Arthur E. Jay in 1893, and served as secretary of the concern continuously. He was president of the Economy Box and Pie Plate Company, president of the Marion Mattress Company, president of the Washington Theater Company, president of the Cubberly Tobacco Company, and a director of the Johnston Furniture Company, all of Marion, and a director of the Gorell Furniture Company, Chicago.

He was born here and graduated from the Marion High School. He attended Valparaiso University and later taught in Grant County schools. He was employed for several years as a paper salesman by the Fisher Brothers Paper Company, Fort Wayne, and left that concern to go into the paper business here. He was a member of the Mecca Club, Meshingomesia Country Club and Presbyterian Church.

Surviving are the widow, two daughters, Mrs. Margaret Hama, Marion, and Mrs. Betty Smith, Geneva, Ohio; and a brother, O. D. Weesner; a sister, Mrs. Nellie Sharon, both of Marion, and two grandchildren.

John T. Sheehan

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., August 17, 1936.—John T. Sheehan., aged 48, a salesman in the employ of the Garrett-Buchanan Company, died of a heart attack on Sunday while preparing for a round of golf on a course at Digby, Nova Scotia.

He had just left the clubhouse with Frederick Harner, also of Philadelphia, and two other friends, when he collapsed. A few hours earlier he had attended services at St. Patrick's Catholic Church, at Digby, and sang several solos.

Mr. Sheehan lived at 8820 Germantown Avenue. He is survived by his brother, Dr. William C. Sheehan, with whom he lived, and three sisters, Miss Mary E. Sheehan, well-known Catholic poet; Mrs. P. F. Glynn, of Chestnut Hill, and Mrs. William H. Smith, of Erdenheim.

Jesse R. Myers

CLEVELAND, Ohio, August 17, 1936—Jesse R. Myers, aged 66, sales promotion manager for the Union Paper and Twine Company, died recently at Huron Road Hospital after a sudden illness.

He was a member of the Advertising Club, the Chamber of Commerce, the Art Craft Club and Woodward Masonic Lodge. Born in Bucyrus, Ohio, he came here in 1890 after attending Wooster College.

Mr. Myers is survived by his widow, May E.; two daughters, Elta and Mrs. Robert Rimer; a son, Dr. Everett C.; a brother, George W. of Arlington, Ohio and three sisters in Indianapolis.

To Close Rumford Mill

R. J. Cullen, president of the International Paper Company, announced early this week that the Rumford, Me., plant of the Continental Paper and Bag Mills, Inc., a subsidiary, will be closed in the near future. Suspension was decided upon, Mr. Cullen said, following a survey which convinced the company that continued operation of the plant would be economically unsound. Operations will be transferred to other mills, it was stated.

C. T. Jewell Goes With Treadwell Supply Co.

[FROM OUR REGULAR CORRESPONDENT]

WATERTOWN, N. Y., August 15, 1936—Corwin T. Jewell, former manager of the St. Regis Paper Company, has taken the position as traveling salesman for the Treadwell Supply Company and he will travel extensively throughout the state selling paper mill supplies. He will fill the vacancy created by the recent death of George W. Tripp.

FIRST IN THE COUNTRY

SCULPTURED IN METAL BY L. L. BALCOM

"DR. LIVINGSTONE, I PRESUME" . . .

. . . is a phrase that will last forever in the hearts of all who worship courage, fortitude and the spirit of adventure. For it is the phrase that climaxed Stanley's great expedition into the Dark Continent in search of the lost explorer and missionary. A similar expedition into a dark continent of American industry was made in 1909 by EBG engineers when they produced Liquid Chlorine for the first time in the U. S. A. Since then EBG has shown again and again this pioneering spirit—by being first to adapt the use of Liquid Chlorine to textile bleaching, paper bleaching, shellac bleaching—and most important of all to the health and well being of the nation—to the purification of water supplies and the treatment of sewage.

ELECTRO BLEACHING GAS COMPANY, MAIN OFFICE: 9 EAST 41st STREET, NEW YORK, N. Y. • PLANT: NIAGARA FALLS, N. Y.

EBG Liquid Chlorine

Features of the Chicago Convention

Plans have taken shape for the fall Convention of The National Paper Trade Association to open in Chicago, Monday, September 21. Headquarters this year will be at the Drake Hotel. A condensed program has been decided on so that this meeting will occupy only three days instead of four days as recently.

There will be the usual advance meeting of the executive committee before the convention opens and the first day will be devoted to work of the most important commodity committees, together with the governing committees of the fine and wrapping divisions and the board of directors.

Perhaps the feature of the convention will be consideration of the Robinson-Patman Act, its application and effect on paper merchants in regard both to their buying and selling. J. K. Javits, counsel of the association, whose interpretation of the Act in the form of a Questions and Answers has attracted national attention, will present the subject from a practical as well as a legal point of view. It is expected that the governmental viewpoint will also be presented by one of the most influential Congressional exponents of the Act.

Other topics of outstanding importance covered in the program will be the campaign to prevent discrimination by price publicity to the membership and the simplification of sales policies involving Fine Paper lines.

Recognizing the importance of reflecting to the membership the trade trends to be observed in current operations, the association has collected statistics reflecting the results of the first half year, permitting the compilation of most significant and comprehensive figures to be presented at the convention and enabling members to compare their individual results for the period with the composite of the trade as a whole. These survey reports, covering both Fine and Wrapping Divisions, have been prepared for graphic presentation so that members can make comparisons which will be of invaluable assistance in affording guidance for the future.

The executives of the Association feel that the information promised by their program insures a record-breaking attendance at the approaching convention.

May Form Division of Industrial Economics

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, August 19, 1936—There is a movement on foot now at the Department of Commerce for the creation of a so-called division of industrial economics in that department, which would be comparable to industry to what the bureau of agricultural economics, in the Department of Agriculture now is to the farmers of the country. Secretary of Commerce Roper, who is still abroad, has yet to be sold on the new organization.

Work has gone so far, it is understood, that a provisional appropriation of $1,685,000 for the next fiscal year has been provided in the budget for the bureau of foreign and domestic commerce for this new work.

If this new bureau should eventuate, it would take care of many things not now done by the department of commerce such as a study of distribution which has long been on the mind of the secretary of commerce and many other studies of an economic nature of the business and industrial structure which has never been done by the commerce department and which is well within its province.

It is reported that the matter has been fully discussed by the Roper business advisory council and that it has the backing of that organization.

Indianapolis Shows Some Improvement

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., August 17, 1936—Several items in the paper market showed some improvement during the last week, according to local jobbers. However, the fine paper demand has not rebounded as the trade has expected. One reason for this is given as the continued hot weather. Fall advertising campaigns are being held up until there is a definite change in temperatures. The situation is far from discouraging, however, for there is a world of advertising contemplated for fall and even under present conditions the summer slump has not been as severe as in former years.

On the more optimistic side are all grades of common paper. The last week or two have seen demand for common paper, including wrapping papers and bags, take a considerable demand impetus. Local jobbres say not only was there but little slump during the summer months, but that the fall demand is starting early with every indication of far more business this fall than in other years. Container factories also are reported to be doing a good volume. Warehouse stocks are low and orders now have begun piling up so that production in most instances has increased. The demand base also is widening considerably, more and more consumers being in the market.

Newsprint demand holds steady with no change in prices. While there has been some slump during the hot weather, the linage is picking up now and demand is having a slow but steady increase. In fact the outlook for the coming season is considerably better than it was a year ago.

Due to weather conditions, demand for all summer specialties continues unabated. Dealers are attempting to cut their stocks, but it seems impossible with demand such as it is. This month end likely will see the first indications of dullness, but many jobbers are expecting a lot of business until after Labor Day.

Some dullness is reported in the paper stock demand, with poorer grades of paper and rags somewhat of a drug on the market. There is a fair demand for better grades. Prices are rather low.

Finds Freight Rates Not Unreasonable

WASHINGTON, D. C., August 17, 1936—C. W. Griffin, an Examiner of the Interstate Commerce Commission has prepared a proposed report in the case of the National Paper Products Company against the Southern Pacific Company.

The Examiner found that carload rates on sulphate of alumina from Nichols, Cal., to Port Townsend, and Port Angeles, Wash.; on soda ash from Trona, Cal., to Port Townsend, and on woodpulp, moving in interstate or foreign commerce, from Port Angeles to Seattle, Wash., Vancouver, B. C., and Los Angeles Harbor, Cal., are not unreasonable.

The Examiner states also that interstate rates in wrapping paper, in carloads, from Port Townsend to Seattle and San Francisco, Cal., are not unreasonable or unduly prejudicial. He recommends that the complaints be dismissed.

Groveton Installs New Equipment

GROVETON, N. H., August 17, 1936—The Groveton Paper Company is installing a tub sizing equipment. It is expected that the work will be completed in about two weeks. All three machines of the company are running full and have been for some time.

Boston Paper Market Steady

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., August 17, 1936—The Boston wholesale paper market, on the whole, was satisfactory for the season of the year last week. In fact, the usual summer slump was hardly in evidence. In some quarters of the fine paper division, the market was quiet, but not so quiet as usual. In other quarters, the situation was reported as very good indeed. In wrapping paper, rather a good volume of sales developed, higher than that of a year ago. The board market is hardly better than fair. In some quarters, July was a good month, but August, so far, has been less active.

Generally speaking, the paper stock market was in a favorable condition. With some dealers, old papers were rather quiet, with specialties not moving so well "as they ought to," but in other quarters they were very active in all grades.

Mixed papers advanced to .32½ @ .35 from a flat of .30 and old newspapers likewise were quoted at .32½ @ .35, advancing from a flat .32½. Other grades were steady at the same levels of the previous week. Bagging was a little firmer, with rope steady, and prices unchanged. Scrap burlap bagging for paper making and shredding appeared to be in a better situation. Inquiries have been coming in from various directions, especially the South.

New domestic rags were steady, new cuttings, particularly, holding their own. Values remained the same. In old domestic rags, prices were unaltered. Roofing rags were steady, with a much better feeling prevailing. Roofing business is expected to be much better over the next several months, so that roofing paper mills will be active buyers of material. Prices of foreign rags are still too high over across to be conducive of much trading.

Parker-Young Plan Disapproved

CONCORD, N. H., August 17, 1936—Justice George F. Ferris of the United States District Court of New Hampshire refused to confirm plans for reorganization of the Parker-Young Lumber Company of Lincoln.

In his decision, Justice Ferris gave the opinion that the plan, which is one of the three presented to the court for consideration during the past two years, would result in inequitable adjustments of the relationship between preferred and common stockholders. The request for elimination of the reorganization plan came from a block of stockholders who held the new proposition to be impracticable and unfair to them.

The plan, presented by Attorney Frank Barber of Brattleboro, Vt., and George Pike of Lisbon, counsel for the company, was intended for addition to the plan of reorganization filed several months ago and approved by the court. The addition was to have completed a section of the original which provides for payment of bondholders on a basis of 37½ per cent of their investment.

The court reported that another plan of reorganization would probably be prepared for presentation at a later date.

Cochrane Electric Flow Meters

The Cochrane Corporation, 17th street and Allegheny avenue, Philadelphia, has just issued Publication 2096, describing Cochrane Electric Flow Meters for remote measurement of steam, water, gas and other fluids. This publication describes in detail the highly accurate galvanometer null principle of measurement and includes description of the styles available for different applications of fluid flow measurement.

Merchants Industries Files With SEC

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, August 17, 1936—Merchants Industries, Inc. of Dayton has filed with the SEC a registration statement seeking approval of the disposal of 20,279 shares of its common stock. The funds derived from the sale will be used to increase plant capacity, reimburse the treasury, and will also supply additional working capital.

Pine, Brownell & Company of Dayton are the principal underwriters. The shares are to sell to the public at $7.50 per share. The authorization capital of the company is 150,000 shares with a par value of one dollar, of which 79,721 shares are outstanding, 20,279 to be sold, and 50,000 shares to remain in the treasury for financial requirements.

The company, which is engaged in paper and printing branches, moved from Minneapolis, Minn., in 1926, and at present occupies a modern plant on Home Avenue, Dayton. The company has a branch plant at Linden, New Jersey.

The company manufactures sales books, stationery, calendars, office and factory forms, loose leaf forms, and books, shipping tags, book matches, advertising specialties and is known as a manufacturing printing concern and conducts a lithographing and designing business.

It handles a large assortment of miscellaneous printed and manufactured paper products and covers the United States with a large sales force.

The officers are A. C. Trapp, president; N. H. Nelson, vice-president and H. H. Marshall, secretary and treasurer.

The Future of Freight Rate Surcharges

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 19, 1936—Manufacturers and shippers of all commodities are going to be much interested to find out what the railroads of the country are going to attempt to do in connection with the freight rate surcharges which are now in effect and which expire on December 31 next.

A meeting of the roads was held here last week but no conclusions were reached and no date set for a further meeting. The general consensus of opinion seems to be that the roads will ask to have surcharges continued on individual items, inasmuch as the Interstate Commerce Commission has already refused to allow any blanket surcharge. In well informed circles it is stated that the roads will ask that the present surcharge on all of the specific items be allowed to be continued. No one here seems to know just when the roads will take action looking toward this end.

Vandals Act at Holyoke Wire Cloth Co.

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., August 18, 1936—Vandals cut and destroyed the reeds and wire cloth, finished and in process of construction of the Holyoke Wire Cloth Company on Main street early last week. There has been a strike on for some time but the proprietors had forgotten about it until the act of vandalism took place. The police view also is that it was strikers or strike sympathizers who did damage amounting to around $2,000. They also stole the shuttles to the looms and presumably threw them into the river or elsewhere. Energetic action of the owners resulted in the plant starting up after a day's layoff. Guards have since been placed about the plant. The night watchman makes a tour of the plant each hour and the wrecking was done between his tours. The company had duplicate parts for every part destroyed and thus were enabled early to resume operations.

Cuba Imports All Its Book Papers

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 19, 1936—No book paper is manufactured in Cuba, so that the entire needs of the country are imported, according to a report from Assistant Trade Commissioner Kathleen Molesworth.

Only a few magazines import high grade paper and its use for printing of books is also very limited. Consumption of book paper in Cuba is increased by its use as a writing paper. For this purpose a hard sized paper is used, which is generally cheaper and more satisfactory for making up writing pads and similar articles. The greater part of this paper is imported from Europe on a price basis. As paper for magazines and books is imported free, under guarantee that it is to be used exclusively for this purpose, the c. i. f. Habana price is the deciding factor. In this connection, it is claimed that considerable amounts of paper which are imported ostensibly for publications are actually sold for other purposes.

Under the heading of book paper, the largest imports are probably a machine finished paper which is used for box linings and covers, for making envelopes, pads and blank books, for magazine covers and for general lithographic work. It is a hard-sized paper known locally as "satinago," and is imported in both plain and colored sheets. A large part of this paper comes from Germany, but Finland has also supplied a certain amount on a price basis. European quotations are generally the same c. i. f. Habana as the United States f. o. b. New York. The American product is said to be of better quality than the European. A poster paper with a smooth finish on one side comes chiefly from the United States, Germany, and the United Kingdom. Cigar labels are printed on a heavy chrome paper from Germany and the United States. Fancy coated paper for box covers comes from the United States and European countries, the report states.

Developments in Maritimes

A despatch from Halifax states that Mersey Paper Company has completed the purchase of the entire holdings of the Barnjum Forst Foundation, Nova Scotia, Ltd., comprising approximately 17,000 acres of woodland, in the counties of Victoria, Guysboro, Queens and Annapolis. It further states that the Minas Basin Pulp and Power Company is building an extension to its plant at Hantsport. The present capacity of the plant is 90,000 lbs. of groundwood per day.

To Be Chairman of Soundview Pulp Co.

SAN FRANCISCO, Cal., August 15, 1936—Harry H. Fair, San Francisco capitalist and president of Soundview Pulp Company, was elevated to chairman of the board at yesterday's meeting of directors.

U. M. Dickey of Everett, Wash., heretofore vice-president, was named to succeed Fair as president.

The board declared the regular quarterly dividend of 75 cents a share, payable September 1 on stock of record August 15 including the stock to be issued on account of subscription rights expiring today.

Scott Paper Co. Raises Common to $2 Basis

Directors of the Scott Paper Company declared a quarterly dividend of 50 cents a share, establishing common on a $2 annual basis, against $1.80 previously. Dividend is payable Sept. 15 to holders of record Aug. 31.

Manning Paper Co. Expands

[FROM OUR REGULAR CORRESPONDENT]

TROY, N. Y., August 19, 1936—Expansion of the Manning Paper Company, which recently observed its 80th anniversary, has been proceeding steadily for years and it is now rated amongst the largest concerns in the district. Paper manufactured at the Green Island plant is made principally from rope fiber which provides a product running from .0075 inch to .1250 inch in thickness. The thinning papers are classified into two groups, they being used principally for wire insulation for use in small motors to heavier cables such as telephone and power lines. The heavier papers are used principally for flour sacks and sandpaper backings. Production at the Mount Ida plant in this city is confined mostly to rag boards which are used to a great degree in the construction of transformers. This product ranges in thickness from .030 inches to .125 inches.

Fire Destroys Paper Stock of Eddy Corp.

THREE RIVERS, Mich., August 15, 1936—The Three Rivers Eddy Paper Corporation unofficially estimated its loss in despoiled paper stock stored in the ruined Sidway-Topliff buildings at Elkhart, which were damaged by fire last week, at between $12,000 and $13,000.

The fire, which started Thursday noon, was not checked until Friday despite the efforts of 30 Elkhart firemen. The paper stock—estimated at 1,360 bales, had been stored in the rented space for a period of about one year. It was covered by insurance.

B. C. Pulp Interest To Build Railway

Pulp and paper interests are understood to have now completed surveys for laying of a 35 mile standard gauge logging railway in the near future in Queen Charlotte Islands, nothern British Columbia, where extensive timber reserves are held.

The proposed railway would run from Queen Charlotte City on Graham Island to extensive timber stands to the west of Massett Inlet and towards Naden Harbor. This timber is gradually becoming over-mature, and must be taken out before long.

American Writing Shows Loss of $122,485

HOLYOKE, Mass., August 17, 1936—For the six months ended June 30, 1936, American Writing Paper Company reports net loss of $122,485 after interest, depreciation and idle plant expense, but before non-recurrent items. This compares with a loss in the first six months of 1935 of $126,016. In the first half of this year there were non-recurrent expenses items of $172,519.

Net sales in the half year totaled $3,079,836 against $2,820,165 in the first half of 1935.—*Boston Herald.*

Rainier Pulp Co. Has Good Year

The Rainier Pulp and Paper Company reports for the year ended April 30 net profits of $771,649 after depreciation, Federal income taxes and other charges, equal under participating provision of shares to $3.46 a share on combined 100,000 no-par shares of $2 cumulative participating Class A stock, and 123,000 no-par shares of Class B common. This compared with $743,509, or $3.33 a share on combined stock, in previous year.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

Hoquiam, Wash.—The Grays Harbor Pulp and Paper Corporation has plans maturing for expansion and improvements in local sulphite pulp mill, to include construction of several new buildings and installation of equipment to advance present capacity about 50 tons per day. A new digester unit will be installed with accessory equipment, new screening equipment, bleaching plant machinery and miscellaneous operating equipment. The program will include a new filter plant, equipped for a capacity of about 10,000,000 gallons per day. Entire project will cost close to $150,000. W. S. Lucey is general manager.

St. Paul, Minn.—The Rapinwax Paper Company, Como avenue, manufacturer of waxed and other processed papers, has awarded general contract to the F. J. Romer Construction Company, 190 Ramsey street, for rebuilding of portion of plant recently damaged by fire, previously referred to in these columns. Work will include interior repairs and will be placed under way at once. Company will also replace equipment damaged by the fire.

Buffalo, N. Y.—The Wagner Folding Box Corporation, 1534 Bailey avenue, manufacturer of paper boxes and containers, has filed plans for alterations and improvements in plant. Work will be placed under way at once. No estimate of cost announced.

East Chicago, Ind.—The United States Gypsum Company, 300 West Adams street, Chicago, Ill., manufacturer of wallboard products, etc., has completed plans for new addition to plant at East Chicago, to be one-story, 80 x 420 feet, estimated to cost over $100,000, with equipment. Bids have been asked on general contract and work on superstructure will be placed under way at early date.

Brooklyn, N. Y.—The Allen Paper Box Company, Inc., recently organized with capital of $10,000, plans operation of local plant for manufacture of a line of paper boxes and containers. New company is represented by Samuel Fingerhut, 299 Broadway, New York, attorney.

Savannah, Ga.—The Union Bag and Paper Corporation, Woolworth Building, New York, N. Y., manufacturer of kraft paper bags and containers, etc., has awarded contract to the Virginia Bridge Company, Roanoke, Va., for structural steel framing for new additions to plant at Hermitage Plantation, Savannah, totaling about 1,000 tons. Deliveries will begin at early date and work placed under way. As previously reported in these columns, work will comprise a group of one-story buildings to recently completed plant, to increase rated output by over 100 tons per day. Completion is scheduled early in 1937. Entire project will cost about $2,750,000, with equipment over original mill investment of about $6,500,000. Merritt-Chapman & Scott Corporation, 17 Battery place, New York, N. Y., is general contractor for project. George F. Hardy, 309 Broadway, New York, is consulting engineer.

Cheboygan, Wis.—The North American Pulp and Paper Corporation is arranging for the early production of a new tissue product, in addition to its regular line of output, including pattern papers. Large capacity in new line will be carried out. The mill is now giving employment to about 110 persons in different departments.

Carthage, N. Y.—The National Paper Products Company, manufacturer of tissue and other paper stocks, has awarded general contract to J. J. Turner & Sons, Inc., Edwards street, Amsterdam, N. Y., for new one-story addition to mill, and will proceed with superstructure at once. It will be 225 x 335 feet, estimated to cost in excess of $150,000, with equipment.

Elkhart, Ind.—Fire recently damaged the local building occupied under lease by the Eddy Paper Corporation, Three Rivers, Mich., for factory branch, storage and distributing plant, with loss reported close to $30,000. It is planned to rebuild at early date.

Nitro, W. Va.—The Viscose Company, 2 Park avenue, New York, N. Y., manufacturer of cellulose rayon products, has approved plans for new one-story addition to mill at Nitro, and superstructure will begin at early date. New unit is reported to cost in excess of $100,000, with equipment.

Menasha, Wis.—The Central Paper Company has awarded miscellaneous contracts for completion of new one-story addition, 60 x 90 feet, now in course of erection, including heating, plumbing, etc. Overhead doors will be installed by the Overhead Door Company, Milwaukee, Wis., and steel sash by the Federal Steel Sash Company, Waukesha, Wis. Fluor Brothers & Smith, 48 Otter street, Oshkosh, Wis., are general contractors. New unit will be used primarily for storage and distributing service.

Los Angeles, Cal.—The United States Gypsum Company, 8430 Quartz avenue, South Gate, Los Angeles, manufacturer of wall board products, etc., has approved plans for new addition to local factory branch, storage and distributing plant, to be one-story, 48 x 225 feet, estimated to cost close to $55,000, with equipment. General contract for erection has been awarded to the Austin Company of California, Inc., 777 East Washington boulevard, and work will be placed under way at once. Main offices of company are at 300 West Adams street, Chicago, Ill.

Wisconsin Rapids, Wis.—The Hydro-Electric Power Company of Wisconsin, in which the Consolidated Water Power and Paper Company, Wisconsin Rapids, is interested, has plans under way for an extensive hydroelectric power project on the Wisconsin River. W. F. Thiele, engineer for last noted company, is chief engineer in charge of proposed development. It will consist of a series of three hydroelectric generating stations at different points, with transmission lines in parts of Wood, Marathon, Portage, Juneau and Adams Counties. Program will include construction of two large water reservoirs, and is reported

to cost in excess of $1,000,000. It is proposed to carry out project under Federal financing and application has been made for a grant and loan to PWA. Work will begin when fund is available.

Hull, Que.—The E. B. Eddy Company, Ltd., manufacturer of newsprint, wrapping papers and other paper stocks, has approved plans for new addition to local mill on Bridge street, including improvements in different departments of present mill. General contract has been awarded to the Foundation Company of Canada, Ltd., Montreal, Que., which will begin work in near future. New Equipment will be installed. Entire project is estimated to close to $250,000, including machinery.

Toronto, Ont.—The Goldring Paper Box Company, Ltd., Kitchener, Ont., manufacturer of paper boxes and containers, has leased space in building at 366 Adelaide street West, Toronto, and will equip and occupy at once for new branch plant.

Burnie, Tasmania—The Associated Pulp and Paper Mills, Ltd., recently organized with capital of $15,000,000, represented by H. Brain, Collins House, Melbourne, Australia, secretary, has contracted with C. Walmsley & Company, Ltd., Bury, England, paper machinery manufacturer and engineer, for all work in connection with proposed new pulp and paper mill at Burnie, recently referred to in these columns. The award covers the design and layout of plant, comprising several large units, with power house, pumping station and other mechanical divisions, to be equipped for an initial capacity of 15,000 tons of fine printing and writing papers per annum; also for the supply of main paper-making machinery, the calling for bids for other equipment to be installed in mill, and for supervision in erection of buildings and machinery at plant site. J. A. Laing will be superintendent in charge of construction. Work is scheduled to begin in the fall. The company has taken over a large tract of land for the mill and also has contracted for extensive timber properties for pulpwood supply. The new company has succeeded to the Tasmanian Paper Pty., Ltd., and has arranged financing in amount of $6,000,000, to provide funds for erection and initial operations. The Amalgamated Zinc Company, Ltd., Melbourne, Australia, is interested in the project.

Moscow, Russia—The Soviet Russian Government, Paper Trust, Moscow, has plans nearing completion for two new pulp and paper mill projects at Zeling Doe and Inguar Georgia, respectively. Each plant will consist of a group of one and multi-story units, with power house, pumping stations, filter plants and other mechanical divisions. The first noted mill will be equipped for a capacity of about 19,000 tons of sulphite pulp and 15,500 tons of finished paper per year; the other mill at Inguar Georgia, will have a rating of about 12,000 tons of finished paper per annum. The entire project will cost close to $2,500,000, with buildings and machinery.

Demand for Small Paper Rolls Expands

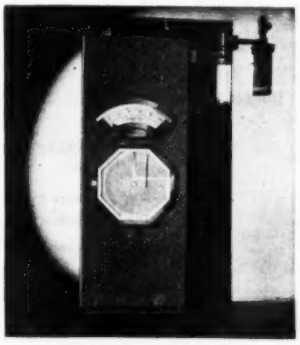
[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., August 18, 1936—The demand for paper rolls of small size for use in various machines is running steadily ahead of the demand a year ago, according to the Eastern Specialties Company of Holyoke. The use of such rolls of varying sizes and for varying uses in business houses is increasing.

The increasing use of the teletype is opening a new market for paper rolls. Yellow paper rolls are favored for some uses particularly in newspaper offices where the glare of the white paper for night work is avoided as much as possible.

New Republic Meter

The latest developments in the measurement of CO_2 are incorporated in a new design of CO_2 meter. Experience gained in hundreds of plants over a period of many years has been utilized in building this improved analyzer.



The per cent CO_2 in the flue gas is measured by the Orsat method, which is the accepted standard for industrial practice, and the meter is built to duplicate, mechanically, this chemical analysis.

The meter is driven by a fractional horsepower electric motor and requires no water for its operation. There is no possibility of stoppage in the gas line as the instrument has a suction capable of drawing fourteen inches of mercury. The large caustic tank holds enough potash to last from four to six months. Temperature variations have no effect on the meter readings. A filter in the gas line removes all CO_2 from the flue gas before it reaches the analyzer. A permanent, continuous, pen line record is inscribed which may be read directly in per cent CO_2 and arrangements of indicators and recorders may be made to fit any requirement. Related factors, such as steam flow, temperature, draft, pressure, etc., may be combined on one circular chart. The entire meter is ruggedly constructed with a minimum of moving parts, assuring years of satisfactory service under the most severe boiler room conditions. The new meter is made by the Republic Flow Meters Company, 2240 Diversey Parkway, Chicago, Ill. Data Book 403, giving complete description, will be mailed upon request.

Hammermill Agents to Meet

The twenty-fifth annual conference of the Hammermill agents will be held at Erie this year Thursday and Friday, August 27 and 28. Recreational and social activities will be held in the afternoons of both days. The business sessions and social activities will be at the Kahkwa Club, a few miles out of the city of Erie, and the registration of guests will be handled at that place.

Richardson Co. Declares Dividend

DAYTON, Ohio, August 17, 1936—A dividend of 40 cents a share on common capital stock of the Richardson Company was declared the past week, payable September 14, to stockholders of record August 28.

This payment will bring to $1 the amount paid in dividends this year. Last year the company, which is widely-known in the trade, distributed 80 cents.

American Writing Sales Show Gain

HOLYOKE, Mass., August 17, 1936—Sales of the American Writing Paper Company thus far this year have run approximately 10 per cent ahead of 1935. This gain applies to general business papers, blue print and book papers. While fine writing papers show only a 5 per cent increase, industrial and specialty lines are running 20 per cent ahead.

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U. S. FOREIGN PAPER TRADE UNIFORMITY HIGHER DURING FIRST HALF OF 1936

The United States foreign trade in both paper and paper base stocks was uniformly higher during the first half of the current year as compared with the corresponding six months in 1935 according to the Forest Products Division of the Department of Commerce.

Exports of paper and paper products from the United States during the first half of the current year reached a total of $11,048,621. This figure exceeds that of the corresponding period last year by 12 per cent and is the highest for any half year period since 1931. While this increase is due in part to a higher average price level in a number of products, outstanding increases in the volume of shipments also contributed to this result. Boards and board products in particular seem to have enjoyed a better demand this year. Exports of boxboards were 30 per cent higher than last year, insulating boards and vulcanized fiber increased 25 per cent, and boxes and cartons 36 per cent. Printing papers, including both newsprint and book paper were under the 1935 volume. Writing papers were about on a level with last year so far as quantity of shipments were concerned, but were nearly 25 per cent higher in value. Exports of over-issue news were approximately 15 per cent below the 1935 shipments. In this connection, it might be noted, however, that some improvement set in during the spring months and that shipments during the second quarter were nearly on a level with the same period last year, whereas the first quarter's shipments showed a reduction of 25 per cent compared with the first three months of 1935.

Exports of paper base stocks, amounting in value to $5,461,713, were 9 per cent above similar shipments for the first half of 1935. Shipments of bleached sulphite pulp to the amount of 50,902 tons accounted for 63 per cent of this group. Unbleached sulphite accounted for another 23 per cent, and the remainder was made up largely of rags and other waste paper stock.

Imports of both paper and paper base stocks into the United States were uniformly higher during the first half of the current year.

Imports of newsprint, which accounted for 87 per cent of our paper receipts during this period reached a total volume of 1,228,096 tons, an increase of 127,976 tons, or 11 per cent, over the first half of 1935. The value of these receipts at the same time increased from $38,083,480 to $44,317,584, or by 16 per cent.

Imports of other classes of paper are relatively insignificant compared with newsprint. Arrivals during the January-June period reached an aggregate value of only $6,346,049, which figure, however, represented an increase of 22 per cent compared with the corresponding six months in 1935. Increases occurred chiefly in imports of printing papers. Arrivals of cigarette paper which rank next to newsprint in value, were slightly under the 1935 receipts.

Total imports of paper and paper products during the first six months of 1936 were valued at $50,663,633 as against $43,283,178 during the corresponding period last year.

Arrivals of wood pulp into the United States up to the end of June were up more than 25 per cent, compared with the corresponding six months in 1935. All classes contributed to this result with the heaviest increases occurring in bleached sulphite and unbleached sulphate (kraft) pulps, which were more than one-third larger than during the first half of last year. Imports of bleached sulphate increased 19 per cent and of groundwood 17 per cent. Arrivals of rags during this period more than doubled and waste stock for paper making increased nearly 60 per cent. The smallest increase was registered in consignments of pulpwood which were not quite 10 per cent over last year.

Total imports of paper base stocks reached a valuation of $43,764,336, divided as follows: Wood pulp, 1,023,585 tons valued at $37,475,362; pulpwood, 397,817 cords valued at $2,817,450; and rags and other waste to the amount of 108,652 tons, valued at $3,471,524. Imports of paper base stocks during the first half of 1935 reached an aggregate value of $33,944,800.

JULY NEWSPRINT STATISTICS

Production of newsprint in Canada during July 1936 amounted to 274,627 tons and shipments to 271,794 tons, according to the Newsprint Service Bureau. Production in the United States was 73,361 tons and shipments 74,535 tons, making a total United States and Canadian newsprint production of 347,988 tons and shipments of 346,329 tons. During July, 29,246 tons of newsprint were made in Newfoundland, so that the total North American production for the month amounted to 377,234 tons. Total production in July 1935 was 338,819 tons.

The Canadian mills produced 243,694 tons more in the first seven months of 1936 than in the first seven months of 1935, which was an increase of sixteen per cent. The output in the United States was practically the same as for the first seven months of 1935, in Newfoundland produc-

tion was 10,090 tons or five and two-tenths per cent less, and in Mexico 11,598 tons less than in 1935, making a net increase of 222,716 tons, or nine and nine-tenths per cent.

Stocks of newsprint paper at Canadian mills were reported at 75,430 tons at the end of July and at United States mills 19,857 tons, making a combined total of 95,287 tons compared with 93,628 tons on June 30, 1936.

Imports of Casein Heavy

Imports into the United States of casein have advanced rapidly in recent months with France supplying more than half the total, according to C. C. Concannon, Chief of the Commerce Department's Chemical Division.

During the first five months of the current year a total of 8,025,000 pounds of casein or lactarene have been imported into the United States compared with only 823,500 pounds during the corresponding period of 1935, preliminary statistics show.

Ordinarily Argentina supplies the bulk of our casein imports but during the current year France has taken the lead with 4,434,000 pounds against 2,540,000 pounds from Argentina. Smaller quantities were received from Canada, Brazil, New Zealand, the Netherlands, Germany, Belgium, and the United Kingdom, it was stated.

The increase in imports of casein since the beginning of the year is of interest particularly in view of the fact that the United States had in recent years attained a high degree of self-sufficiency in connection with its casein requirements.

During the decade ending with 1930, though our domestic production was increasing rapidly, reaching a peak of 42 million pounds during the latter year, more than half our domestic requirements of casein was obtained through imports. In 1931, however, imports decreased sharply to 3 million pounds, or less than 10 percent of our estimated domestic consumption during that year, and in 1932 only 1,475,000 pounds were imported, statistics show. Since then casein imports have continued small with the exception of 1933 when 8 million pounds were imported, and in the first five months of the current year when receipts approximated 8 million pounds.

Casein is widely produced throughout the United States, particularly in California, Wisconsin, New York, Illinois, Vermont, Idaho, Minnesota, Pennsylvania, Michigan, Oregon, Washington, Ohio, New Jersey, Utah and Massachusetts. The domestic production in 1934, the latest year for which data is available, amounted to 37,331,000 pounds compared with 24,087,000 pounds during the preceding year, it was stated.

While casein has wide use in industry, trade estimates allocate about three-fourths of United States consumption to the manufacture of coated paper.

Water at Holyoke Ample Despite Hot Spell

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., August 18, 1936—Despite the intense hot spell the river is holding up well and Sunday there was water a foot over the height of the dam, being held back of course by flashboards. It is forecasted that there will be no need of restrictions this week. Paper manufacturing is now at low ebb as is customary this time of the year; but it is estimated that during the year so far business has been 10 per cent better than for the same period a year ago. Specialty paper demand is holding out well. The call for high grade bond and ledger papers has not as yet recovered from the doldrums.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association:

COMPARATIVE MONTHLY SUMMARIES

Month	1936	1935	1934
January	76.1%	65.8%	.....
February	77.9%	70.0%	.....
March	76.0%	70.5%	.....
April	82.3%	70.0%	.....
May	81.6%	69.4%	.....
June	80.7%	72.3%	.....
July (b)	79.9%	67.8%	.....
August	.....	70.9%	.....
September (c)	.....	75.0%	59.4%
October	.....	75.6%	64.7%
November	.....	75.3%	61.7%
December (a)	.....	74.3%	62.1%
Year	.....	71.2%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1936		CORRESPONDING WEEKS, 1935	
*July 4 (b)	82.6%	July 6 (b)	58.5%
*July 11	75.6%	July 13	69.1%
*July 18	80.2%	July 20	71.8%
*July 25	80.4%	July 27	70.3%
*August 1	81.3%	August 3	70.7%
*August 8	76.8%	August 10	70.0%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks					
Ratio Limits	July 4, 1936	July 11, 1936	July 18, 1936	July 25, 1936	Aug. 1, 1936	Aug. 8, 1936
0% to 50%	94	99	90	84	77	71
51% to 100%	239	232	238	241	236	168
Total Mills Reporting	333	331	328	325	313	239

* Subject to revision until all reports are received.
These data exclude (a)—Christmas Day, (b)—Fourth of July, (c)—Labor Day.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours," were as follows:

1934	1935	1935	1936
Sept. 62%	Jan. 61%	July 59%	Jan. 61%
Oct. 63%	Feb. 67%	Aug. 65%	Feb. 67%
Nov. 56%	Mar. 67%	Sept. 69%	Mar. 68%
Dec. (a).. 53%	April 61%	Oct. 76%	April 70%
	May 61%	Nov. 70%	May 68%
	June 65%	Dec. 60%	June 68%

Week ending July 4, 1936—65%
Week ending July 11, 1936—53%
Week ending July 18, 1936—71%
Week ending July 25, 1936—70%
Week ending Aug. 1, 1936—74%
Week ending Aug. 8, 1936—71%

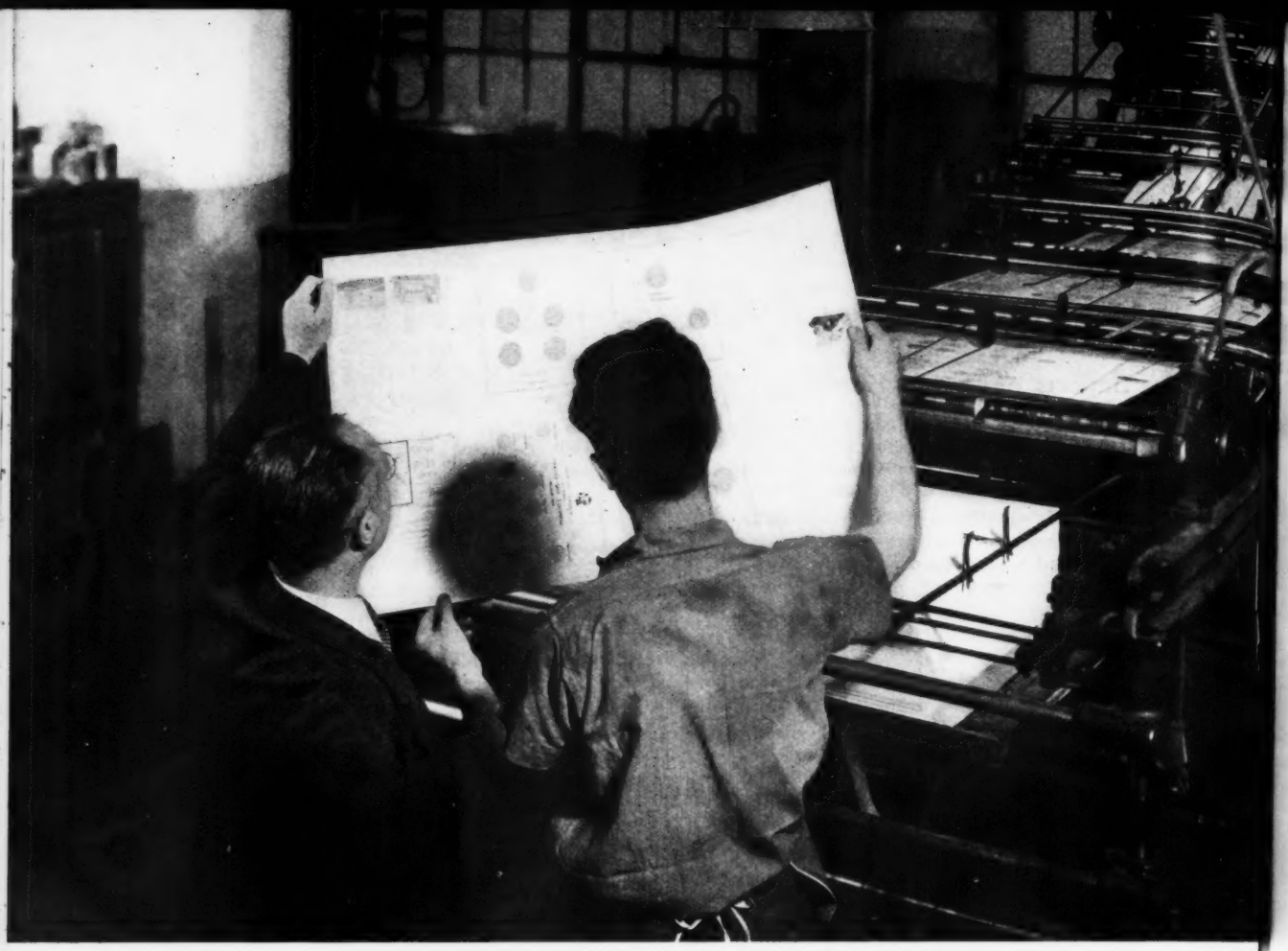
Speculation Regarding U. S. Paper Purchases

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 19, 1936—A great deal of interest has been evidenced in the manner in which the Government Printing Office will purchase its paper on the open market under the new Walsh-Healey government contract bill, effective on September 28.

While no one will speak with authority on the question at this time it is understood that the Printing Office will continue to purchase its paper on the open market as it does now—at least for the present time. Attention has been called to the fact that the Printing Office does not ordinarily buy paper on the open market amounting to $10,000 which is named as the sum in the law.

In the meantime the Joint Congressional Committee on Printing will have to open bids for an annual or semi-annual supply of paper for the Government Printing Office sometime in December in view of the fact that present contracts expire on December 31 next. When these new specifications are drawn the Joint Committee will have to decide what its policy will be. It is to be assumed that following that decision the Government Printing Office, in the future, will have to do what the committee decides. In the meantime, however, unless there is some change in the present plan, the Printing Office will continue to buy paper as it has in the past.



"Okay"!

And no wonder—for coming through this printer's press is one of those "better" printing jobs done on Zinc Sulphide Pigmented paper. Better because the reproduction of his type and delicate halftones is enhanced by the brilliant whiteness of the paper. Better, too, because the Zinc Sulphide prevents any shadowy "show through" from marring the easy reading, clean cut appearance of his work.

Cryptone and **Albalith** Zinc Sulphide Pigments can be advantageously used in practically all types of white paper. And they offer an economical means of producing more opaque, whiter and brighter papers that will please *everyone*—the dealer, the printer and the consumer.

Our Technical Service Staff will welcome an opportunity to discuss the application of these pigments to your papers.

THE NEW JERSEY ZINC COMPANY
160 FRONT ST., NEW YORK

ZINC SULPHIDE PIGMENTS IN PAPER

Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Pulp and Paper Industry Literature Review

Abstracts of Articles and Patents Compiled by the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Raw Materials

Utilization of Sorghum Vulgare in the Paper Industry. C. Levi and E. Debenedetti. Ind. carta 2, no. 9: 453-457; no. 10:501-507 (Sept., Oct., 1935).—The different varieties of sorghum vulgare (broom corn, millet), their cultivation in Italy and previous researches with regard to their paper making properties are reviewed. Different cooking experiments on a laboratory scale with a white and red Italian variety, both grown in the province of Tuscany, are described. The white variety gives a better yield and an easy-bleaching product, suitable for the manufacture of better class wrapping papers. The red variety is richer in non-cellulosic constituents and much harder to bleach, particularly on account of a colored pigment which it contains. It can be used for the lower grades of wrapping paper.—C. J. W.

Chemical Composition of Flax Chaff. B. P. Osanov and A. G. Sizova. Bumazhnaya Prom. 14. no. 7:72-73 (1935); C. A. 30:857.—Four samples of flax chaff were sifted through a nest of four sieves of different mesh, giving 2.2-18.8% of bast fiber, 21.4-62.6% coarse and 21.1-60.7% of fine chaff, with 5.5-23.1% dust. The samples and their fractions were analyzed and cooked. The coarse and fine fractions of chaff are of similar composition. The bast fraction contains the greatest percentage of cellulose. The greater part of the dust consists of inorganic matter. To obtain uniform pulp, it is necessary to remove the dust from the chaff and to separate the bast fibers.—C. J. W.

Production of Fine Papers from Cotton Waste and Flax-Hemp Siftings. A. Ya Goncharov. Bumazhnaya Prom. 14, no. 7:66-71 (1935); C. A. 30:858.—A good grade of pulp, suitable for reworking into copy and cigarette paper, was obtained from various cotton waste and flax-hemp screenings by cooking with 15 per cent sodium hydroxide and sodium sulphide at 3.5-4 atmospheres pressure for 12 hours and subsequent two-stage bleaching with 5-6 per cent calcium hypochlorite.—C. J. W.

Utilization of the Larch Tree in the U. S. S. R. I. S. Matyuk. Bull. Applied Botany, Genetics Plant Breeding (U. S. S. R.), Ser. A, No. 14:185-194 (1934); C. A. 30:603.—A compilation of data on the turpentine and cellulose content of the larch.—C. J. W.

Production of Fine Paper From Oiled and Tarred Rag Waste. G. S. Tzuipkin. Bumazhnaya Prom. 14, no. 10:50-55 (1935); C. A. 30:1228.—Canvas and fishnet waste was cooked with 8-10 per cent lime and 2-5 per cent sodium hydroxide at 3-4 atmospheres for 6-10 hours, depending on the degree of contamination with oil and tar and then bleached with 12 per cent calcium hypochlorite. The stock after reworking was used in mixture with 25 per cent of bleached and 25 per cent of unbleached sulphite pulp in the production of a good grade of cigarette paper.—C. J. W.

Viscose Pulp and Viscose-Pulp Woods. VI. Microbiological Decay of Japanese Beech. M. Shikata and I. Tutiyama. J. Agric, Chem. Soc. Japan 11:730-733 (1935).—Soda pulp from the rotting beech *(Fagus sieboldi,* Endl.) is serviceable, but poorer in quality than that from sound beech, if the rot has not been too extensive.—A.P.-C.

Cellulose Resources. I. Chemical Composition of Deccan Hemp and Indian Mallow Cultivated in Manchuria. Masuzo Shikata, Kazuhiko Akagi and Nobukiyo Urano. J. Argr. Chem. Soc. Japan 11:621-623 (1935).—Analyses of the basts and stalks of Deccan hemp (*Hibiscus cannabis* L.) and of Indian mallow (*Abutilon avicennae* Gaertn.) are given.—A. P.-C.

Utilization of Pinus Insignis in Paper Making. Vidal, Brot and Aribert. Bull, Inst. Pin., 181-185 (Sept., 1935). —*Pinus insignis,* at least up to the age of 20 years, has a wood comparable to that of *Pinus sylvestris.* It behaves similarly when treated by the sulphite, soda or kraft processes, and the micrographic characteristics of the fibers are similar to those of *Pinus sylvestris.*—A.P.-C.

Process for the Utilization of Sugar Cane Bagasse. Alfred M. Thomsen. U. S. Pat. 2,031,239 (Feb. 19, 1936). —Pith is preferably separated from the fibrous portion by mild mechanical treatment as in a ball mill. The fiber is cooked, preferably continuously in a series of digesters, at relatively low pressure (30 lbs. or less) with a solution of sodium sulphide or sodium bisulphite. The spent liquor is evaporated to syrupy consistency incinerated (with or without addition of salt cake) under reducing conditions giving a mixture of sodium carbonate and sulphide which are separated by fractional crystallization.—A.P.-C.

Improved Process for the Recovery of Fibers from Waste Papers. Snyder MacLaren Processes, Inc. Fr. pat. 790,280.—Waste paper is treated with a suitable reagent (depending on the nature of the waste paper) at a consistency of 10 to 60 per cent and at a temperature of 38 deg. to 65 deg. C.—A. P.-C.

Deinking Waste Paper. Sidney D. Wells, assignor to Lewis L. Alsted. U. S. pat. 2,018,938 (Oct. 29, 1935).—Waste paper is disintegrated and agitated in a soapy solution till the ink is loosened from the paper and a foamy mass is produced containing subtantially no free liquid. The bubbles with the pigment particles adhering thereto are separated from the fibers by means of a screw press, the presence of the soap bubbles preventing the fibers from felting together and at the same time reducing by 50 to 70 per cent the power consumption of the screw press.—A. P.-C.

Recovery of Waste Paper. A. van der Werth. Papier-Ztg. 60, no. 84-1475-1476; no. 85:1491-1492 (Oct. 19, 23, 1935).—A review of German patents on de-inking methods.—C. J. W.

Concerning the Specific Gravity of Pulp Wood. Rudolf Sieber. Papierfabr. 33, No. 37; 305-08; no. 38: 313-19, (Sept. 15, 22, 1935).—A group of individual mills collaborated in assembling data on the specific gravity of the pulp wood used. The submersion method was used to determine the specific gravity. Wood from German sources was divided into regions, with the following results, Middle Germany 0.447; Saxony 0.479; South Germany 0.452; and Bavaria 0.459. Wood from foreign sources were also tested, Czechoslovakia 0.445; Austria 0.457; Baltic 0.443; Russia 0.447; Poland 0.438; Finland 0.453 and north Sweden 0.453. Pine wood gave a specific gravity of 0.505 and aspen 0.454.—J. F. O.

Highly Purified Wood Pulps in the Viscose Process. Chester H. Goldsmith. Rayon and Melliand Textile monthly 16:513-514 (1935).—The advantages of highly purified wood pulp over the ordinary rayon pulp now on the market are pointed out.—A. P.-C.

Rayon Pulp from Southern Pine. Chas. H. Herty. Textile World 85:1840 (1935).—Comparative data on properties of rayon yarn of different manufacturers, purchased on the open market, and rayon yarns made from southern pine in the laboratory indicated that the pine sulphite pulps are fully suitable for commercial rayon production.—A. P.-C.

Cellulose

The Formation and Structure of Cellulose Membranes. Wanda K. Farr. Pulp Paper Mag. Can. 37: 74-78 (Conv. No. 1936).—Microscopic examinations under polarized light and ultra-violet rays showed that cellulose membranes consist of fibrils that are built up of particles approximately 10,000 by 15,000 Angstrom units, that are not identified with the hypothetical "micellae" and that consist chiefly of cellulose surrounded by a very small amount (probably not more than 1 or 2 per cent) of cementing material that seems to be of pectic nature. The particles are crystalline, and when the membrane is swelled with water, the particles become separated by the absorbed water and the swollen cementing material. It is shown that the cellulose component of the plant cell membrane does not dissolve in cuprammonium solution to produce the viscosities commonly attributed to it, but that the cementing material which surrounds the particles is responsible for this phenomenon.—A. P.-C.

True Density of Cellulose. W. B. Campbell and J. K. Russell. Quart. Rev. Forest Prod. Labs. Can. 21: 24-26 (1935).—The density of cotton cellulose does not vary according to the nature of the liquid medium if precautions are taken to avoid intermediate drying. Values recorded in water, methanol, ethanol and benzene all approximate 0.62, and it is no longer necessary to postulate the presence of water of extraordinary high density in order to account for the lower values hitherto obtained with water by comparison with helium and with organic solvents. It is believed that the results lend support to the conception of shrinking by forces of internal liquid tension, bonding by recrystallization, and the formation of pockets in the structure, when cellulose is dried from water.—A. P.-C.

The Morphology of Cellulose Fibers as Related to the Manufacture of Paper. Geo. J. Ritter. Paper Trade J. 101, no. 18:92-100 (Oct. 31, 1935).—A description of the morphology of cellulose fibers are depicted by different investigators, together with a brief discussion of both generally accepted and controversial views regarding the morphology and some of the attendant physical properties of fibers.—A. P.-C.

The Penetration of Pyridine and Methanol into the Crystal Lattice of Cellulose. Keiroku Fuchino and Ichiro Sakurada. Bull. Inst. Phys.-Chem. Research (Tokyo) 14:300-302 (1935).—X-ray patterns of water-cellulose dipped for 30 min. in pyridine, ethanol, methanol or glacial acetic acid and then sealed in a Keesom tube were examined.—A. P.-C.

The Hygroscopic Moisture of Cellulose. XIII. Indirect Determination of the Heat of Sorption of Water Vapor on Cellulose. S. Oguri and T. Yoshida. J. Soc. Chem. Ind. Japan 48 Supp. Binding, 434-436 (1935).—An apparatus is described which uses a chemical balance. Standard cotton cellulose was used for the experiments, and about 30 hrs. was required for establishment of the sorption equilibrium. Results at 15.00 deg., 20.00 deg. and 25.00 deg. C, are reported. The heat of sorption was calculated by means of the Clausius-Clapeyron equation, and data are presented for sample moisture of 6.00 to 16.00 per cent. Graphs are shown for percentage of relative humidity. The points at different temperatures lie on a single curve for the temperature range covered when plotted against the relative humidity; this indicates that the sorption of water vapor will be almost independent of the temperature if the relative humidity is kept constant.—A. P.-C.

The Nature of Cellulose. E. Heuser. Paper Trade J. 101, no. 21: 39-46; no. 22: 35-41; no. 23: 39-42 (Nov. 21, 28, Dec. 5, 1935).—A historical review with bibliography of 59 references.—A. P.-C.

X-Ray Examination of the Effect of Removing Non-Cellulosic Constituents from Vegetable Fibers. W. T. Astbury, R. D. Preston and A. G. Norman. Nature 136: 391-392 (1935).—No fundamental change in the X-ray photographs was noted after removal of xylan from fibers of high xylan content.—A. P.-C.

X-Ray Examination of the Effect of Removing Non-Cellulosic Constituents from Vegetable Fibers. J. Hewitt. Nature 136; 647 (1935).—Chlorinated fibers of sisal with the chlorine compounds not removed give photographs of diminished intensity. With purified fibers there is no diminution of intensity; an improved definiton results.—A. P.-C.

Some Aspects of the Oxidation of Cellulose. H. A. Turner, J. Soc. Dyers and Col. 51: 345-352 (1935).—Oxidation of cellulose is accelerated by the presence of certain easily oxidizable substances. The relation between the mechanical strength of modified cotton cellulose and the viscosity in cuprammonium probably depends on the frequency distribution of the molecular chain length.—A. P.-C.

Measurement of the Variation of the Dielectric Con-

stant of Water with Extent of Adsorption. G. H. Argue and O. Maass. Can. J. Research 13B: 156-166 (Sept., 1935).—An experimental technic was devised for the measurement of the dielectric constants of cellulosic materials containing various amounts of adsorbed water. From measurements made with standard cellulose the dielectric constant of the adsorbed water was calculated over the concentration range 0 to 18 per cent of water. The dielectric constant of the water initially adsorbed is less than one-quarter of that of liquid water, but it increases with the amount of water subsequently adsorbed, until the dielectric constant approximates that of liquid water as the water content of the fiber approaches the saturation point. These results are shown to be in agreement with the hypothesis concerning the nature of the system cellulose-water.—A. P.-C.

Measurement of the Heats of Wetting of Cellulose and Wood Pulp. G. H. Argue and O. Maass. Can. J. Research 12: 564-574 (April 1935).—The heats of wetting of dry cellulose and wood pulp have been measured for the first time. The influence of the initial water content of the cellulose on the heat of wetting has been determined. It is shown that when the water is left as a result of partial desorption a higher value is obtained. The heats of wetting of wood meal and different wood pulps have been determined. The heats of adsorption were calculated, and all the data are discussed from the point of view of the physical structure of cellulose. A few preliminary measurements of the heat of adsorption of sodium hydroxide were made. The experimental technic of using a rotating adiabatic calorimeter is shown to be admirably adapted for measurements of this kind.—A. P.-C.

The Sorption of Water Vapor on Cellulosic Materials. Edgar Filby and O. Maass. Can. J. Research 13B: 1-10 (July, 1935).—A direct method for measuring the adsorption of water vapor on cellulosic materials and in which a number of improvements were made is described. It is ensured that no vapors other than water are present no matter how long a time is required for the establishment of equilibrium. The adsorption and desorption isotherms of standard cellulose, spruce wood, surgical cotton, Kodak rag cellulose, and bleached sulphite were measured, and the data which indicate the time required for the establishment of true equilibrium are given. The data of Urquhart and Williams *(J. Textile Inst.* 15: T138-148 (1924); *Shirley Inst. Mem.* 3: 49-307 (1924) for standard cellulose are shown to be correct.—A. P.-C.

The Mechano-Chemical Dissection of Wood Fibers. A. J. Bailey. Paper Industry 17: 735-739 (Jan., 1936).—Beating pulp failed to cause adsorption of dyes or acetic acid. The fine material resulting from fiber disintegration was found to consist of a hydrogel and granular debris in what appeared to be definite proportions. Both were identified as cellulosic in nature. Cellulose fibers disintegrated into fibrils of a frequently recurring size and a more chemically active gel which appeared to arise from a substance forming a matrix for the fibrils. The hydrogel, which was shown to be cellulosic, formed a horny mass when dried and resisted softening almost completely when re-exposed to water. The presence of two types of adhesion in paper was shown and its significance discussed. Fibrils were reduced to cylindrical units which seemed to be laid end to end and to form fibrils, indicating, possibly, that the ends of enough micelles or micelle series occurred in one point to cause a weak spot. The fibrils of a commonly recurring size, considered to be a structural unit, had uniformly and symmetrically tapered ends which, presumably, overlapped to form a more or less continuous structure. A hypothesis is offered to explain the experimental observations, and is discussed in the light of current knowledge of fiber structure.—A. P.-C.

Concerning the Physics and Chemistry of High Polymers. Discussion by the Faraday Society, Cambridge, Sept. 26-28, 1935. Zellstoff u. Papier 15, no. 11: 433-34 (Nov., 1935).—Topics discussed concerning the cellulose molecule were; roentgenography, type and form of the molecule in solution, viscosity of solutions of highly polymerized substances, kinetics of polymerization and the mechanical properties of high molecular substances.—J. F. O.

Lignin

Spruce Wood Lignin. Peter Klason. Svensk Pappers-Tidn. 39, no. 1: 1-2 (Jan. 15, 1936).—The steps are briefly outlined which are involved in the formation from coniferyl aldehyde of monolignosulphonic acid and the latter's relation to other lignin bodies. The author criticizes certain beliefs of Freudenberg about lignin groupings while offering substantiation for his own views concerning the same.—C. J. W.

Quantitative Determination of Lignin in Wood. Peter Klason. Svensk Kem. Tid. 47, no. 12:298-300 (Dec., 1935).—Klason refers to the work of Hilpert and Littman (Ber. 67:1551-1556 (1934)), who found xylose to give a residue of 36 per cent of difficultly soluble products when treated with 72 per cent sulphuric acid at room temperature for 24 hours. Klason found that under the same conditions but with 60 per cent acid xylose dissolved completely but that on standing the clear solution darkened and finally deposited a residue weighing 4.7 per cent of the original xylose. An improved method for lignin determination with 65-66 per cent sulphuric acid is given.—C. J. W.

Lignin Investigations. XI. Spruce wood and mercapto acids. B. Holmberg. Ber. 69, no. 1:115-119 (Jan. 8, 1936).—The preparation of condensation products of spruce lignin with mercapto acids is described. The empirical formula of the lignin as it combines with the mercapto acids can be expressed as follows: $C_9H_{8\ .\ 90}O_{2\ .\ 85}(OCH_3)_{0\ .\ 92}$. In this formula the author has included the molecule of water which is presumably lost in the reaction between lignin and the mercapto acids.—C. J. W.

Ethyl Lignin and Thioglycolic Acid. G. A. Berg and B. Holmberg. Svensk Kem. Tid. 47, no. 10:257-265 (Oct., 1935).—A method is developed whereby the ethyl lignin as prepared from the original wood meal may be treated with thioglycolic acid to produce ligno-thioglycolic acid. Basic studies involved the reactions of several aromatic ethyl ethers with Holmberg's lignin reagent, thioglycolic acid, and it was found that the ethyl radical was replaced by the thioglycolic acid. Corrected values for the analyses of lignins prepared with ethyl alcohol and with thioglycolic acid agree remarkably well. In the presence of hydrochloric acid as a catalyst, thioglycolic acid and ethyl lignin give a fraction richer in thioglycolic acid than without catalyst and a smaller fraction also much richer in thioglycolic acid. This latter originates possibly from a lignin richer in water.—C. J. W.

Hydrolysis of Spruce and Beech Woods. K. Storch. Ber. 68B, no. 12: 2367-2374 (Dec. 4, 1935).—Hydrolysis of spruce wood with 64 per cent sulphuric acid at room temperature for 3-48 hours always gave the same amount of lignin (28-30 per cent). In the case of beech wood, however, high yields (24 per cent) are obtained when the mixture is heated and diluted before the residue is filtered, otherwise the lignin yield amounts to only 12 per cent. The behavior of the methoxyl groups during hydrolysis is described.—C. J. W.

New Reaction of Lignin and Vanillin. Pierre Fourment and Henry Roques. Bull. sci pharmacol. 41:449-451 (1935); C. A. 30:478.—Vanillin gives with diphenylenediamine in acetic acid a red color which disappears after a few seconds. The color remains stable when the vanillin is covered with liquid petrolatum and shaken with diphenylenediamine acetate. It is supposed that the color produced by the latter substance with lignin is caused by the presence of a vanillin nucleus in wood.—C. J. W.

Chemistry of Jute Lignin. VII. Behavior of organic compounds towards chlorine dioxide and its significance on the Constitution of Lignin. Pulin Behari Sarkar. J. Indian Chem. Soc. 12:470-475. VIII. Methylation of lignin. *Ibid.*, 542-546. IX. Acetylation of lignin. *Ibid.*, 547,551. For abstracts of these organic articles *see* Chemical Abstracts 30:478-479.—C. J. W.

Studies on Lignin and Related Compounds. XII. Methanol Lignin. Fritz Brauns and Harold Hibbert. Can. J. Research 13B: 28-34 (July, 1935).—Methanol lignin was prepared by extracting spruce wood meal with absolute methyl alcohol, using hydrochloric acid as catalyst. In 5 small bomb-tube experiments, methanol lignin preparations having the same methoxyl content (about 21.6 per cent) were obtained, the product in each case being apparently homogeneous. The methanol lignin was acetylated, partially methlylated by treating with diazomethane, and fully methylated with dimethyl sulphate and sodium hydroxide. From the elementary analyses and the ratio of methoxyl in the original methanol lignin to that in the diazomethane-methylated compound a formula for the smallest building unit of the methanol lignin and for the native lignin can be derived; it is represented by the empirical formula $C_{47}H_{52}O_{16}$, or, expanded $C_{42}H_{32}O_6(OCH_3)_5(OH)_5$.—A.P.-C.

Studies of Lignin. XIII. The Structure and Properties of Glycol Lignin. K. R. Gray, E. G. King, Fritz Brauns and Harold Hibbert. Can. J. Research 13B:35-47 (July, 1935).—Lignin was extracted from spruce wood meal with ethylene glycol containing (a) 0.05 percent and (b) 0.2 per cent hydrogen chloride. On purification the two glycol lignins were found to contain 16.9 per cent methoxyl and 62.8 per cent carbon and 16.5 per cent methoxyl and 64.7 per cent carbon, respectively. The aqueous glycol mother liquor was found to contain a soluble lignin-carbohydrate compound. The glycol lignin could be separated into a chloroform-insoluble and a chloroform-soluble fraction each having the same chemical composition and yielding the same methylated products. From the glycol lignin, purified by means of dioxane-ether, acetylated and methylated derivatives were prepared, as were also trityl derivatives of glycol lignin and premethylated glycol lignin. The introduction of three trityl groups indicates the presence of three primary alcohol groups in the original lignin. Glycol lignin can be both partially and completely demethylated by use of hydriodic acid. The effect of the glycol radical on the methoxyl value in the Zeisel determination was studied by an equation derived for the correction of the methoxyl value. The bearing of the results on the formula proposed previously for methanol lignin is discussed.—A.P.-C.

Studies on Lignin. XIV. Action of Lead Tetra-Acetate and of Mercuric Acetate on Glycol Lignin Derivatives. K. R. Gray, Fritz Brauns and Harold Hibbert. Can. J. Research 13B:48-54 (July, 1935).—Fully methylated glycol lignin (methoxyl content 30.4 per cent) was treated with lead tetra-acetate and with mercuric acetate. In the first case the acetoxyl group was introduced to the extent of 11.5 per cent. With mercuric acetate in alcohol, the sole reaction was the substitution of hydrogen by the —$HgOCOCH_3$ group, there being no addition of ethoxyl nor loss of methoxyl groups. After repeated mercurization the final product contained 42.7 per cent of mercury, that is, a ratio of introduction of mercury atoms to original methoxyl groups of 1:1.—A. P.-C.

Studies on Lignin. XV. Phenol Glycol Lignin. Fritz Brauns and Harold Hibbert. Can. J. Research 13B: 55-60 (July, 1935).—Phenol condensation products of glycol lignin, of a premethylated and a fully methylated glycol lignin were prepared. In each case it was found that, on the basis of the five methoxyl groups present in the original glycol lignin, three molecules of phenol react with one lignin unit by nuclear condensation, and when the product is worked up immediately no loss of methoxyl groups occurs. With the fully methylated glycol lignin in one experiment, some of the methoxyl groups were removed but the hydroxyl groups thus formed could not be remethylated with diazomethane, thus indicating their probable aliphatic character. Quercetin does not give a phenol condensation product under the same conditions. —A. P.-C.

Studies on Lignin. XVI. Phenol Lignin From Spruce Wood, From Freudenberg Spruce Lignin and Willstätter Spruce Lignin. Irene Koerber Buckland, Fritz Brauns and Harold Hibbert. Can. J. Research 13B:61-77 (Aug., 1935).—The condensation of lignin with phenol by treatment of spruce wood meal with this solvent, using hydrogen chloride as catalyst, yields *two* chemically different phenol lignins, namely, an ether-insoluble and an ether-dioxane-soluble phenol lignin, in a ratio of approximately 3.1. Duplicate preparations gave the same yields of these two fractions, analyses of which gave concordant results, indicating homogeneity and constancy of composition. The analytical results of the ether-insoluble phenol lignin, and of its methylated and acetylated derivatives, can be interpreted on the basis of the Brauns-Hibbert formula for the "native" lignin unit. It is found, in this way, that the ether-insoluble phenol lignin contains *three* new free phenolic hydroxyl groups capable of methylation with diazomethane, while one phenol group has reacted with one hydroxyl group in the lignin unit with formation of a phenyl-oxygen ether linkage. The analytical results of the ether-dioxane-soluable phenol lignin indicate that a much larger quantity of phenol has condensed with the "native" lignin building unit than in the case of the ether-insoluble fraction. The exact number of phenol molecules reacting to form this condensation product has not been determined experimentally although calculations based on analytical data point to a number as large as 15 or 21. The phenol condensation products were obtained from Freudenberg and Willstätter lignins in nearly quantitative yields and found to differ from the directly extracted phenol lignin in that neither of them could be resolved into two fractions, thus indicating that some change had taken place in the native lignin during the isolation process. The Brauns-Hibbert formula can also be applied to interpret the experimental data in both cases. These lignins appear to contain the same fundamental building unit as the ether-insoluble phenol lignin fraction isolated directly from spruce wood, with the difference that the former probably have one additional hydroxyl group capable of acetylation and diazomethane-methylation. The correlation existing between the phenol condensation products from native spruce lignin, isolated Freudenberg lignin and Willstätter lignin provides definite experimental evidence indicating the presence of a chemical unit common to various lignins. The phenol condensation products may serve as valuable reference compounds for proving the

identity of lignins obtained from different sources and by use of different chemical reagents.—A. P.-C.

Studies on Lignin. XVII. Methylation of Willstätter and Freudenberg Lignins. Fritz Brauns and Harold Hibbert. Can. J. Research 13B:78-87 (Aug., 1935).—Both Willstätter and Freudenberg lignins when treated with diazomethane give methylated products containing one additional methoxyl group, calculated on the basis of a molecular weight of about 850 for native lignin. When heated with phenol in the presence of a small amount of hydrogen chloride, *both* diazomethane-methylated lignin derivatives are converted into soluble phenol lignin derivatives containing one more methoxyl group than the corresponding phenol derivatives prepared from original, untreated Willstätter and Freudenberg lignins. The higher methoxyl value is also known by the former phenol lignins on acetylation. The diazomethane-methylated phenol lignin derivatives prepared from diazomethane-methylated Willstätter and Freudenberg lignins correspond with the diazomethane-methylated phenol lignin derivatives prepared from original Willstätter and Freudenberg lignins. Also the fully methylated derivatives prepared from the phenol diazomethane-methylated Willstätter and Freudenberg lignins correspond with those described previously. The difference in methoxyl value between the phenol derivatives obtained from Willstätter lignin and the corresponding derivatives from Freudenberg of 0.8-2.1 per cent may be due possibly to the presence in the Freudenberg lignin of a methylene oxide ring which is removed in the isolation of Willstätter lignin, thus giving rise to the higher methoxyl content in the methylated derivatives of the latter. The action of methyl alcohol on original, on diazomethane-premethylated, and on fully methylated Willstätter and Freudenberg lignins was also investigated. —A. P.-C.

Studies on Lignin. XVIII. Lignin Sulphonic Acid—A Preliminary Investigation on Its Isolation and Structure. E. G. King, Fritz Brauns and Harold Hibbert. Can. J. Research 13B:88-102 (Aug., 1935).—Several methods for the isolation of a pure lignin sulphonic acid were studied. A satisfactory method, using dialysis in the presence of an excess of sulphurous acid, followed by precipitation with quinoline and subsequent decomposition with sodium hydroxide, was developed. The free acid is unstable, becoming insoluble on standing or when heated above 50 deg. C., particularly in the presence of mineral acids. Treatment with pyridine and acetic anhydride also yields an insoluble material. The salts of lignin sulphonic acid are stable towards heat and methylation reagents at room temperature and therefore are more suitable for investigations on its structure. The methyl and benzyl esters have been prepared but in low yield only, a result, presumably, of the well-known abnormally reactive character of esters of sulphonic acids. The permutoid character of its salts makes it difficult to prepare the neutral salts in a pure state. The pure sodium salt, however, was prepared by the use of electrometric titration to indicate the neutral point. The salts (sodium, thallium, silver) are soluble in alcohol containing a trace of water, but are precipitated by inorganic salts such as sodium or thallium acetate. The acid on methylation with methyl alcohol-hydrogen chloride yields a product which is soluble in organic solvents and in water, and which contains an additional methoxyl group. Methylation of the free acid with diazomethane gives a water-insoluble product (18.4 per cent methoxyl), while a similar methylation of the sodium salts yields a water-soluble product (19.4 per cent methoxyl on the ash-free basis). The acid therefore contains at least one free phenolic or enolic hydroxyl group. It can be methylated at room temperature with dimethyl sulphate and sodium hydroxide (5 per cent excess) to a maximum methoxyl content of 27.7 per cent (on the ash-free basis), no structural change, other than the loss of some loosely bound sulphurous acid, apparently taking place. The analytical data provide additional support for the empirical formula for lignin proposed by Brauns and Hibbert.—A. P.-C.

Studies on Lignin. XIX. Alkali Lignin. H. Borden Marshall, Fritz Brauns and Harold Hibbert. Can. J. Research 13B:103-113 (Aug., 1935).—Alkali lignin was prepared by the method of Mehta (*Biochem J. 19*: 958-978 (1925)). It was separated into fractions, termed Alkali Lignin A, insoluble in dioxane-ether, and Alkali Lignin B, soluble in dioxane-ether. Both compounds were acetylated, partially methylated with diazomethane and fully methylated using dimethyl sulphate and sodium hydroxide. Treatment of both alkali lignins with phenol, using hydrogen chloride as catalyst, yielded phenol condensation products. Phenol Alkali Lignin A was acetylated, partially methylated with diazomethane and completely methylated with dimethyl sulphate and sodium hydroxide; it was found that one mole of Alkali Lignin A reacted with two moles of phenol. Alkali Lignin B yielded two phenol derivatives, an ether-insoluble and an ether-soluble product, which differ in the number of attached phenol groups. *p*-Bromophenol and *o*-bromophenol also react with Alkali Lignin A giving lignin derivatives having identical methoxyl and bromine content. On treatment of Alkali Lignin A with anhydrous methyl alcohol and hydrogen chloride a product with a higher methoxyl content was obtained, indicating the presence of hydroxyl groups capable of methylation with this reagent. From the analytical data of the different compounds some theoretical conclusions are drawn, and empirical formulas derived. —A. P.-C.

Hydroxyl Groups in Lignin. Pulin B. Sarkar. Science and Culture 1:60 (1935).—Methylation of lignin in the ordinary way does not give accurate information as to the number of hydroxyl groups present since new hydroxyl groups are formed during isolation by partial decomposition of the dioxymethylene group. Methylation of pure jute lignin, separated at low temperatures and washed with dilute caustic soda, with dimethyl sulphate and caustic potash below 22 deg. C., gave a maximum methoxyl content of 34.51 per cent after exhaustive methylation. On the assumption of 19.18 per cent methoxyl in pure lignin, molecular weight 830, 5 additional methoxyl groups were introduced in the above methylation. Similarly, the acetylation of lignin isolated in the usual way and that produced at low temperatures gave compounds which showed the presence of 31 to 32 per cent and 29.45 per cent of acetic acid. The latter figure is in agreement with the assumption of the presence of 5 hydroxyl groups in lignin, molecular weight 830. The fact that the methoxyl values of the fully methylated produce remained constant on refluxing with 28 per cent sulphuric acid or twice normal alcoholic caustic potash for 3 to 4 hrs. showed their ether linkage.—A. P.-C.

Bagasse. VII. Comparison of Bagasses and Wood Lignin. Yoshikazu Hachihama, Hachiro Saegusa and Wasuke Takemura. J. Soc. Chem. Ind. Japan 38, Supp. Binding: 416-417 (1935).—Comparison of the ultraviolet absorption spectra and of the solubility of pentosan and lignin from hydrochloric acid and caustic soda digested bagasse and Todomatsu softwood samples showed that bagasse lignin differs distinctly from softwood lignin and resembles hardwood lignin in physical and chemical aspects—A. P.-C.

Concerning the Lignin in Straw and Deciduous Woods. R. S. Hilpert. Cellulosechemie 16, no. 10:

92-96 (Nov. 10, 1935).—The chemistry of the lignin of straw and deciduous woods is discussed in detail.—J. F. O.

Mechanical Process

Standard Types of Defiberers. A. A. Khlebnikov, Ya. G. Rozental and F. E. Pimenov. Leningrad. Oblastnoi Sovet Nauch. Inzhenerno-Tekh. Obshchestva Tzellyulozno-Bumazhnoi Prom. (Problems of Pulp-Paper Production No. 4:42-55 (1935); C. A. 30:1226.—Screw defiberer is considered the most satisfactory of the continuous-action type of defiberers. A four-press hydraulic defiberer is considered more economical than a screw defiberer.—C. J. W.

Method of Analysis and Composition of Pumiceous Defiberizing Stones. M. I. Koifman. Bumazhnaya Prom. 14, no. 9:28-35 (1935); C. A. 30:1226-1227.—The composition of several grades of Norwegian defibering stone was determined by a method of mechanical decomposition and microscopic analysis. The working top layer is composed of ground corundum-pumice 60-61, portland cement 16-20, sodium silicate 10.6-14.5 and organic matter 0.2-0.4 per cent. The loss in weight on ignition is about 8 per cent. The core contains feldspathic sand 55, sawdust 4-5, portland cement 18-25 and sodium silicate 8-14 per cent. The loss in weight is about 7 per cent.—C. J. W.

Fungi in Groundwood Pulp. O. Bade. Papir-J. 23, no. 23:296-299; no. 24:303-305 (Dec. 23, 31, 1935).—The author confirms his previous findings that grinding temperatures above 45 deg. C. are extremely favorable to fungus growth and should be avoided. Slime spots will occur less frequently in mills with copper-lined equipment, than in those still using old wooden or iron pipes. Whenever spots once show up they are bound to spread, whether an open or closed white water system is employed. The author also found that pulp baled under high pressure is more liable to infection than ordinary lap pulp. Bales exposed to freezing showed strong fungus growth after thawing, whereas pulp bales from the same lot which had not been frozen were perfectly intact. In conclusion, the three main sources of infection, namely, fresh water, wood, and air are briefly discussed. The fresh water is now regarded as of subordinate importance only. General experience tends to show that non-floated wood is more exposed to fungus attack than floated wood. Air infection is considered the most important source. Dampness in mills must be carefully checked, especially the dripping from ceilings and roofs. Regular addition of chemicals to the pulp for combating fungi was tried in some mills but not found sufficiently effective, at least not in the case of cheap chemicals, the only ones to be considered for this purpose. Experiments with antagonistic fungi are now under way in some mills, but no conclusive results are yet available.—C. J. W.

Groundwood Quality Expressed By Freeness and Bursting Strength. H. A. Patterson. Pulp Paper Mag. Can. 37:79-880, 126 (Conv. No., 1936).—By expressing in a suitable manner the relationship between the freeness and bursting strength of groundwood, it can be used reliably as an expression of groundwood quality by means of which valid comparisons of different pulps can be made. The manner of expressing the relationship presented by the author consists of a set of curves in which Mullen test is plotted against Canadian standard freeness for a large number of different quality groundwoods; caution is given, however, that the lines in the region of high quality may be less reliable and that more work should be done on that part.—A. P.-C.

Power Consumption Required for the Production of Groundwood. Papier 38; 1125-1126 (Dec. 1935).—A nomograph is given and explained for the interconversion of various methods of expressing power consumption in the production of groundwood.—A. P.-C.

Wood Grinder. Andrew N. Russell and John D. Robb, assignors to Dominion Engineering Works, Ltd. U. S. pat. 2,029,125 (Jan. 28, 1936).—The wood charge in the grinder magazine is continuously fed to the working surface of the stone by means of two groups of reciprocatable feed members arranged at opposite sides of the magazine and actuated by the indirect application of fluid pressure. The feed members are each provided with a number of pivotally mounted pawls, arranged to apply feeding pressure to the wood during movement of the members towards the store and to be automatically retracted from engagement with the wood during the reverse movement of the members. Each feed member is connected to a piston operating in a cylinder equipped with suitable value mechanism, and the latter is operated (either manually or automatically) so that not more than one feed member moves away from the stone at one time. When it is desired to remove the load from the grindstone, the feeding members may be used as lifting devices. —A. P.-C.

Device for Regulating the Load on Pulp Wood Grinders Which Are Not Operated By Electricity. Allgemeine Elektricitats Gesellschaft, Berlin. Finn. pat. 16, 388 (March 15, 1928). —J. F. O.

Alkaline Processes

Effect of Sodium Hydroxide, Sulphide, Sulphite and Carbonate on Straw Pulping. K. A. Dolgov. Bumazhnaya Prom. 14, no. 10:21-35 (1935); C. A. 30:1227-1228.—Rye straw (13.87 per cent moisture content) was pulped three hours at 140 deg., 155 deg. and 170 deg. with equivalent amounts of sodium hydroxide, sodium sulphide, sodium sulphite, sodium carbonate and combinations of these at a dilution of 8 parts of liquor to one part of straw. At 155 deg. the sulphite gave 54.07 per cent, the sulphide 48.48 per cent and the hydroxide 42.89 per cent of unbleached pulp. At 140 deg. the yields are considerably larger, because of the increased content of lignin (by 1.78 per cent), cellulose (1.54 per cent) and pentosans in the monosulphite pulp and cellulose (1.88 per cent), pentosans and lignin in the hydroxide pulp. The best liberation of fiber and highest degree of wetness are effected with the sulphide, followed by the hydroxide and this by the sulphite. The degree of delignification decreases in the following order: sulphide + hydroxide, hydroxide, sulphite + sulphite + hydroxide, sulphite + sulphide, and sulphite. The discoloration of the stocks (dark brown) is greatest with hydroxide and sulphide and lowest (gray) with sulphite + hydroxide and sulphite + sulphide + hydroxide. The latter products can be used without bleaching in the manufacture of some grades of white paper. The hydroxide and sulphide act on straw lignin with the formation of salt-like products, which on acidulation separates organic substances in the amount nearly equivalent to that of the lignin dissolved in the pulping process. With the sulphite sodium lignosulphonate is formed. The action of the hydroxide, sulphide, carbonate and a sulphite on siliva in straw decreases in the order given. A large part of pentosans (about 50 per cent in solution) is decomposed, probably into the corresponding acids. With sodium hydroxide this decomposition leads to formation of resinification products incapable of giving furfural with hydrochloric acid. At 140 deg. sodium carbonate causes considerable delignification and demineralization of straw with solvation of 10 per cent of available pentosans. The effect of the carbonate in pulping with hydroxide and hydroxide + sulphide is probably insignificant but is very strong in pulping with sulphite and sulphite + hydroxide.

The difficulties in bleaching hydroxide and sulphate stocks increase with the higher temperatures of pulping (from 140 deg. to 155 deg.). This may be explained by the formation of humic substances and products of pentosan resinification becoming partly fixed on the pulp fibers. Pulping with sulphite at higher temperatures results in better bleachable stock. More easily bleachable stock of greater whiteness is obtained at 140 deg. and 155 deg. with sulphite + hydroxide followed by sulphite + sulphide + hydroxide. The action of mixed alkalies is more favorable than that of any single reagent (hydroxide + sulphide acts better than hydroxide alone and sulphite + hydroxide acts better than sulphite alone), because of the more effective and milder separation of incrustations. In the process of pulping with reagents containing sulphur, the sulphur compounds are oxidized (perhaps with the aid of certain catalysts) probably at the cost of decomposition of certain organic substances.—C. J. W.

Separation of Cellulose with Chlorine. V. I. Minnaev and S. S. Frolov. Trans. Inst. Chem. Tech. Ivanovo (U. S. S. R.) 1:196-203 (1935); C. A. 30:853.—In the preliminary communication laboratory experiments are described for the separation of cellulose from various cellular waste materials by steeping them in water or lime solution and treating the products with chlorine by the Pomilio-Cataldi method.—C. J. W.

Pulp from Sawdust. I. A. Il'Inskii. Bumazhnaya Prom. 14, no. 8: 86-90 (1935); C. A. 30:857.—Spruce and pine sawdusts cooked, with stirring, with 16 deg. Be sulphate liquor at 8 atmospheres for 4 hours and then bleached with a consumption of 3 per cent active chlorine gave 35.2 per cent of pulp suitable for the production of good grades of paper.—C. J. W.

Use of Waste Chips Resulting from Alkaline Extraction of Rosin in Paper Production. P. D. Zotov. Bumazhnaya Prom. 14, no. 9:45-54 (1935); C. A. 30:857.—Preliminary laboratory experiments showed that the waste chips obtained from the extraction of rosin with sodium hydroxide can be used in the production of sulphate and mechanical pulp comparable in quality to regular stocks. —C. J. W.

Sulphate Pulp Quality Control—Sampling and Testing of Individual Digester Cooks. Carl Fahlstrom. Paper Trade J. 101, No. 21:37-38 (Nov. 21, 1935).—A detailed description of the procedure developed at the Longview, Wash., mill of Longview Fibre Co. for sampling each cook individually as it is being blown to the diffusers and for the rapid determination of the bleachability (degree of cooking) by Wiles' permanganate method (*Paper Trade J.* 98, No. 11:34-36 (March 15, 1935)) in order to control the cooking operation at reasonably short notice. By the use of this procedure, modification of the cooking conditions to obtain a desired change in pulp quality is effected in a much shorter period than previously.—A. P.-C.

Properties and Sulphate Pulping Characteristics of Compression Wood. M. Y. Pillow and M. W. Bray. Paper Trade J. 101, No. 26:31-34 (Dec. 26, 1935).—Compression wood is formed on the lower sides of leaning trees and on the under sides of branches, and can be identified in logs by the presence of eccentric annual rings having unusually large percentages of summerwood in the wider portions of the rings. Its differences from normal wood in gross anatomy, minute structure of individual elements, in chemical composition and in sulphate pulping characteristics, and the differences in the resulting pulps, are described.—A. P.-C.

The Rate of Digestion of Wood in Sodium Hydroxide Solutions. W. J. Nolan and D. W. McCready. Paper Trade J. 102, No. 4:36-42 (Jan. 23, 1936).—Experimental data are reported on the rate of digestion of wood in sodium hydroxide solutions. The data were obtained under conditions such that the influence of the separate operating variables (concentration of sodium hydroxide solution, ratio of sodium hydroxide to wood, temperature of digestion and time of digestion) on the rate of reaction were determined. An empirical method of predicting the rate and extent of the pulping reaction was developed from the data; the method was checked against data reported by other investigators and showed fairly close agreement.—A. P.-C.

Alkali Recovery by Electrical Precipitation. N. W. Sultzer and C. E. Beaver. Paper Trade J. 102, No. 4: 33-35 (Jan. 23, 1936).—An outline is given of the principle of stack loss recovery by electrical precipitation methods, together with a description of a few applications of Cottrell electrical precipitators to soda and sulphate mill recovery units.—A. P.-C.

Technical Improvements, Modernization and Enlarging in the Ground Wood and Pulp Industries of the Northern Countries During the Years 1933-1934. E. A. Ernstler. Zellstoffu. Papier 15, no. 4: 141-46; no. 6: 241-43; no. 7:282-84; no. 9: 357-58 (1935).—The author chronicles the important facts and describes briefly the following events; new Kamyr pulp grinder and pressure system installed in the mill of the Bure A. B.; various screens installed at different mills, the installation of new magazine or continuous grinders in mills in Finland; the new barking drum layout at Skutskar; the Ormell bark press; the parabolic chip screen; Haglunds sulphite acid plant; iron pyrite ovens; Kamyr stock impellor and new bleaching installations.—j. f. o.

Newsprint from Ground Wood Only. A. Bechter, L. Sadownikoff and A. O. Lineff, Zellstoff u. Papier 15, no. 10: 402-03 (Oct., 1935). A description of operating conditions for the production of newsprint from ground wood only are given. Treatment of the fibers with 5 per cent caustic soda or instead a soaking of the log of wood with caustic followed by steaming also gave favorable results. Tests on the finished paper are added.—J. F. O.

Pulp Liquor Processing. George H. Tomlinson. Can. pat. 353,435, (Oct. 8, 1935).—The waste liquor is projected across the upper region of a hot recovery chamber as a spray which is caused to coalesce on a side wall of the chamber after most of the water content has been evaporated. The dried product subsequently falls from the wall to a lower combustion and reducing zone while still containing unburned carbonaceous materials.—A. P.-C.

B & W-Tomlinson Black Liquor Recovery Process at Windsor Mills. Anon. Paper Trade J. 101, No. 18; 30 (Oct. 31, 1935).—A brief description of the installation at the Windsor Mills, Que., plant of Canada Paper Co.—A. P.-C.

Method of Manufacturing Refined Pulp from Straw of Graminaceous Plants. Kenta Kodama. U. S. pat. 2,026,900, (Jan. 7, 1936).—The straw is digested in an acid solution containing sodium bisulphate, hydrochloric acid and sodium chloride (obtained by adding sulphuric acid to brine or to sea-water), and is then digested in a caustic soda solution.—A. P.-C.

Wood Pulp. George A. Richter assignor to Brown Co. Can. pat. 352,605 (Aug. 27, 1935).—A solution containing sodium sulphide and sodium carbonate for impregnating wood chips may contain about 3 to 5 lb. of sodium oxide equivalent per cu. ft. and have a "sulphidity" of 25 to 45%. The impregnated chips are introduced into an alkaline digester and a solution of causticized melt is added sufficient to provide in the digester about 0.15 lb. of alkali in all forms, but calculated as sodium oxide equivalent per lb. of dry wood. The chips

are pulped at 335° to 365° F. for 3 to 4 hrs. The pulp is more easily bleached and is freer from shives than kraft pulp.—A. P.-C.

Process for the Moistening and Impregnating of Dry Cellulose with Alkali Liquors. Farb. und Gerbstoffwerke Carl Flesch, Frankfurt a.M. Ger. pat. 615,621 (July 18, 1930). An addition of 1 per cent of a mixture of 85 per cent chlorcresol and 15 per cent ethyl glycol dibutyl ether is used.—J. F. O.

Belt Conveyors Prove Efficient Means of Handling Black Ash in Pacific Coast Pulp Mill Recovery Room. D. L. Shirley. Paper Trade J. 101, No. 18: 34-35 (Oct. 31, 1935).—A description of the Sandvik steel conveyor belts system installed in April 1935 at the plant of the St. Helens Pulp and Paper Co., St. Helens, Ore.—A. P.-C.

Boiler for Black Liquid Recovery. Josiah H. Rohrer, assignor to Badenhausen Corp. U. S. pat. 2,023,031 (Dec. 3, 1935).—In a boiler for the recovery of heat from the combustion gases of black liquor combustion furnaces, on leaving the furnace and prior to their entry into the first tube bank of the boiler the hot gases are brought into close contact with vertical water tubes extending across the inlet from the furnace into the boiler to rapidly cool them to about 1500° F., thus precipitating out most of the alkali salts contained in the gases before they reach the main banks of tubes of the boiler. The roof or upper wall of the reduction furnace also is water cooled.—A. P.-C.

Treatment of Coal with Black Liquor. N. Cunningham and C. L. Peck, assignors to The Champion Fibre Co. U. S. pat. 1,988,999 (Jan. 22, 1935).—Coal is sprayed with a dust-laying composition formed by emulsifying 60 gal. of oil with 55 gal. of water in presence of 50 lb. of a by-product which separates from black liquor on keeping or on reduction of the water content thereof.—A. P.-C.

Recovery of Chemicals from Waste Pulping Liquors. Harold R. Murdock, assignor to The Champion Fibre Co. U. S. pat. 2,031,974 (Feb. 25, 1936).—A sodium salt that is an oxidizing agent (preferably sodium nitrate) is added to the concentrated black liquor fed to the incinerator.—A. P.-C.

Process for the Complete or Partial Removal of So-called Sulphate Soap from Black Liquor. F. I. Gothner and G. J. Sandstrom, Sandarne. Swed. pat. 83,293 (May 26, 1933).—The soap is washed with sodium sulphate solution.—J. F. O.

Process for the Recovery of Cyanides or Ammonia in the Working of Alkali or Alkalized Waste Liquor in the Pulp Industry. Helmuth von Lewinski, Munich, Ger. pat. 612,649 (Feb. 27, 1932).—The alkaline coke is treated with nitrogen.—J. F. O.

Sulphite Process

The Influence of the Preheating of Wood in Water on the Rate of Delignification By Sulphite Liquor. A. J. Corey and O. Maass. Can. J. Research 13B:149-155 (Sept., 1935).—The rate of delignification of wood chips was measured and found to conform to the monomolecular relation, provided that the standard method of penetration developed at McGill University be used (Saunderson, Johnston and Maass, *Can. J. Research* 8: 415-428 (1933)). Pretreatment of the wood chips by heating in liquid water at 130° C. decreases the rate of delignification by subsequent cooking in sulphite liquor, and the rate no longer conforms to the monomolecular relation. Preheating of the wood to 130° C. in the absence of water does not influence the rate of subsequent delignification. The results indicate the advantage of reducing the time of cooking, and a tentative explanation is offered regarding the mechanism involved.—A. P.-C.

The Influence of Hydrogen Ion Concentration with Pretreatment of Wood on Its Subsequent Delignification. A. J. Corey and O. Maass. Can. J. Research 13B: 289-295 (Nov., 1935).—The results obtained in the preceding paper were checked. The influence of an acid, a salt and a base on the pretreatment of wood at 130° C. was determined, and showed that pretreatment of wood meal decreases the rate of subsequent delignification. Pretreatment was carried out over the temperature range 100° to 140° C. and the effect of temperature was very marked. As it was found that the pH of the water after pretreatment decreased, pretreatment was carried out on a chip in which the pH was kept more constant by a forced flow of water through the chip; the rate of delignification was increased. Pretreatment was carried out in buffer solutions and there was found to be a pH value for which the influence of pretreatment was a minimum. The inferences drawn in connection with sulphite cooking are briefly discussed.—A. P.-C.

Arc Welding Builds Longer Life into Pulp and Paper Mill Equipment. R. R. Kondal. Paper Trade J. 101, No. 18, 50, 52 (Oct. 31, 1935).—A brief outline of the merits of arc welding for sulphite digesters.—A. P.-C.

Studies on the System Calcium Oxide—Sulphur Dioxide—Water. I. Determination of Vapor Pressures and Conductivities. G. W. Gurd, P. E. Gishler and O. Maass. Can. J. Research 13B:209-217 Oct., 1935).—The system CaO-SO_2-H_2O is to be investigated in order to determine the nature of existing equilibria, and the way in which these vary with concentration and temperature. In the present paper a technic is described by means of which vapor pressures and conductivities were measured over the temperature range 25 deg. to 130 deg. C. and over the concentration range 0 to 2.5 per cent and 0 to 6 per cent SO_2. The data obtained are tabulated.—A. P.-C.

Studies on the System Calcium Oxide—Sulphur Dioxide—Water. II. Calculation of Ionic Concentrations. P. E. Gishler and O. Maass. Can. J. Research 13B:308-322 (Nov., 1935).—The conductivity and vapor pressure data of the system CaO-SO_2-H_2O presented in the previous paper were used to calculate ionic concentrations existing in this system in the temperature and pressure ranges investigated. Two methods of calculation were employed, one depending on the combination of vapor pressure and conductivity data, and the other, on conductivity data. For both, recourse was had to the data of Campbell and Maass on the system SO_2-H_2O (*Can. J. Research* 2, 42-64 1930)). The two methods gave results in good agreement with each other, and the existence of a complex $CaSO_3.Ca(HSO_3)_2$ was deduced. Hydrogen-ion concentrations over the concentration and temperature range investigated were calculated and extrapolations made to higher temperatures. They are presented in tabular form. Apart from the theoretical interest, the results are of value in connection with studies of the delignification of wood by calcium oxide—sulphur dioxide—water solutions.—A. P.-C.

Acid Circulation Process (Liquor Circulation) in Sulphite Digesters. W. Abele. Papierfabr. 33, no. 33: 277-78, (Aug. 18, 1935).—Brief discussions on various important factors in the circulation of cooking acid for sulphite pulp manufacture.—J. F. O.

Gas Circulation, Acid Circulation and Evacuation in Sulphite Cooking. T. Samson. Svensk Pappers-Tidn. 39, no. 1:3-6 (Jan. 15, 1936).—Samson emphasizes the following points in this discussion of circulation during the cooking cycle. The air within the chips in the digester should not be considered similar to that in a diving bell with regard to difficulty of removal. The speed with which the acid penetrates the chips depends only slightly upon

the hydrostatic pressure but greatly upon the temperature. Again, the speed of penetration depends largely upon the water content of the chips. Steaming the chips serves the double purpose of displacing the air and equalizing the moisture content. The considerations involved in circulation of both gas and acid during cooking are discussed at some length.—C. J. W.

Improved Results in Sulphite Cooking Through Combined Forced Gas and Liquor Circulation with Preceding Evacuation of the Chips. O. Kreissler. Svensk Pappers-Tidn. 38, No. 19:630, 635-636, 638 (Oct. 15, 1935).—The Lurgi system of forced gas and liquor circulation and its special features are described.—C. J. W.

Vapor-Pressure Studies in the Sulphite Cooking of Wood. P. E. Gishler and O. Maass. Quart Rev. Forest Prod. Labs. Can. 21:1-9 (1935).—A new technic has been developed to study changes in the system CaO-SO_2-H_2O during the digestion of spruce wood, using pure reagents of accurately known concentration. It is established that CaO and SO_2 are used up in the ratio of 1:2. The carbon dioxide produced is a reaction product of lignin and not of cellulose—A. P.-C.

Sedimentation in Water of Sulphite Pulp at Various Degrees of Cooking and at Different Stages During Beating. G. Annergren. Svensk Pappers-Tidn. 38, no. 23:762-763 (Dec. 15, 1935).—Experiments indicate that the rate of sedimentation for a sulphite pulp was greater the more lightly cooked the pulp; in other words, the specific gravity of the fiber decreases as the degree of cooking increases. The rate of sedimentation increases in the early stages of beating but drops off rapidly to a low value for a well-beaten pulp. The author suggests the following explanation for this phenomenon. The initial low specific gravity of the fiber is due to the air which fills the fiber capillaries. Early beating replaces this air with water, tending to make the fibers heavier. As beating continues, fibrillation increases the specific surface of the fiber, which signifies that the specific gravity is decreased and the corresponding rate of sedimentation is reduced.—C. J. W.

Process and Apparatus for Making Iron Oxide and Sulphur Dioxide from Iron Sulphide Ores. Horace Freeman assignor to Nichols Engineering and Research Corp. of Canada, Ltd. U. S. pats. 2,030,627 and 2,030,628 (Feb. 11, 1936).—*No. 2,030,627*—The very finely divided ore is burned in suspension in air during slow passage through a combustion chamber, the amount of air being not materially in excess of that necessary for oxidation of all the sulphur and iron. *No. 2,030,628* deals more particularly with features of construction of a feed nozzle for introducing finely ground iron pyrite into the combustion chamber of a flash roaster, so as to properly distribute the ore and maintain it in suspension while avoiding its coming into contact with the walls of the chamber.—A. P.-C.

Manufacture of Pulp. Clinton K. Textor, assignor to Northwest Paper Co. U. S. pats. 2,022,872 and 2,022,873 (Dec. 3, 1935).—Wood is cooked with a solution of sodium monosulphite and sodium carbonate or bicarbonate of pH not less than 7.5. By proper selection of cooking conditions a pulp as light-colored as unbleached sulphite and as strong as kraft can be obtained. *No. 2,022,872* applies the process to long-fibered (coniferous) wood, and *No. 2,022,873* to short-fibered woods ("hardwoods").

Miscellaneous

Chemico-technological Problems in the Paper Industry. B. Possanner v. Ehrenthal. Chem.-Ztg. 59, no. 75:761-764 (Sept. 18, 1935).—A condensed review is given of the present status and the principal problems confronting the various sections of the pulp and paper industry. Raw materials, chemical and mechanical pulping processes, the cooking procedure, bleaching, drying, testing, beating, sizing, dyeing, water requirements and waste disposal are briefly discussed.—C. J. W.

Highly Purified Wood Pulps in the Viscose Process. Rayon and Melliand Textile Monthly 16 no. 9:513-514 (Sept., 1935).—The article tends to show the superiority of highly purified wood pulps containing 95 per cent or more of alpha cellulose for the manufacture of viscose yarn. A general discussion of the viscose process is given.—C. J. W.

Balance of Water and Fiber in a High-Speed Paper Machine for the Production of Newsprint. D. Ya Plechev. Tzentral Nauch.-Issledovatel. Inst. Bamazhnoi Prom. Materialui 1934, no. 4:252-253; C. A. 29:7651.—The ratio of water to pulp in the paper making process was studied with a view of reducing the waste of pulp carried over with the waste (white) waters. By conducting the suction waters, poor in fiber (0.4-0.5 per cent concentration), directly into the storage basin for collecting the waste waters, the efficiency of the pulp utilization in the paper machine was increased and the concentration of pulp in waste waters was decreased with the corresponding reduction of pulp waste.—C. J. W.

Remarks on Deckle Straps. G. Cesconi. Ind. carta 2, no. 6:297-298 (June, 1935).—Practical directions are given for the smooth running of deckle straps. Reference is made to the inventions by Gustafson and Wentz for the complete elimination of deckle straps.—C. J. W.

Treatment of Wet Felts on Paper Machines. Leo Ubbelohde. U. S. pat. 2,017,640 (Oct. 15, 1935).—The side of the felt which is in contact with the paper is treated continuously on the paper machine with an alkaline-reacting substance to neutralize the acidity absorbed from the paper, and the other side is treated with a suitable antiseptic or bactericidal agent.—A. P.-C.

Means for Impregnating Paper with Liquid. Max Oberdorfer. U. S. pat. 2,018,280 (Oct. 22, 1935).—Paper is impregnated with a preserving oil by creating a fog of the oil and confining the latter by means of a suitable housing in close proximity of one, or preferably two contacting rolls of the calender stack. The fog is suitably created by rotating a roll partly immersed in a bath of the oil and rotating at high speed a brush cylinder close to but out of contact with the roll.—A. P.-C.

Tolerances in White Water Losses. C. M. Baker. Paper Trade J. 101, No. 13, 95-98 (Sept. 26, 1935).—Standards or objectives limiting losses, towards which to work in white water utilization, are desirable. Adoption of arbitrary standards by state officials limiting stream pollution is not feasible because of variations in grades and operating conditions in the mill, and in stream characteristics and requirements; but limiting values might be adopted beyond which a mill should show cause why better operation should not be secured.—A. P.-C.

Synthetic Resins for the Paper Industry. Samuel S. Gutkin. Paper Industry 17, 405-407 (Sept., 1935).—A brief review of recent developments of interest to the paper industry.—A. P.-C.

Which Coal? Chester Reed Earle. Paper Industry 17, 397-401 (Sept., 1935).—A discussion of the principal factors to be considered in determining which coal gives steam at the lowest cost.—A. P.-C.

Steam Generation Capacity of the Boiler Plant. A. R. Calamnius. Finnish Paper and Timber J. 17, no. 13:620, 622, 624, 626-628 (July 15, 1935).—A comprehensive discussion of the factors determining the boiler plant efficiency is given.—C. J. W.

A Method for Determining Whiteness of Paper, II*

By Deane B. Judd[1]

Abstract

In the first paper under this title was proposed a definition of whiteness based on the degree of approach to the appearance of an ideal perfectly reflecting, perfectly diffusing surface. Magnesium oxide was proposed as a working standard white. A plan for testing this definition was outlined; it involved obtaining visual whiteness gradings from 15 observers on a series of 30 papers whose colorimetric specifications were known. The present paper gives the analysis of the results obtained in this way. The general principle of the definition has been corroborated, but it appears that only about one-third of the observers find magnesium oxide an acceptable standard white. About one-third of the observers base their judgments on a standard which is slightly greenish yellow compared to magnesium oxide. This color is called by some of the observers "natural paper white" by which is meant the color of paper made from good grade, well-bleached pulp to which no dye has been added (paper stock is frequently blued with dye). The remaining third of the observers show some agreement with either working standard, but the system or systems of grading used by individuals of this group have been less perfectly discovered. It may be that their criteria for whiteness are inconstant. The definition of whiteness can be written around either working standard with equal convenience, and perhaps a useful purpose would be served by defining both "whiteness" and "natural paper whiteness."

Summary of First Report

In the first communication (*1*) a definition of whiteness was proposed which was based on the degree of approach to the appearance of an ideal perfectly reflecting, perfectly diffusing surface. Magnesium oxide was proposed as a working standard white. A set of 30 papers was collected and their degree of whiteness determined in two ways, first by the proposed method based on the known colorimetric specifications of the papers, and second by direct visual judgment of 15 experienced observers.

From a comparison of the results by these two methods, it was hoped to be able to decide: (1) what standard white best agrees with the grading of whiteness by experienced paper graders, (2) how achromatic departures are balanced against chromatic departures from the standard, and (3) what degree of agreement exists among the various graders.

The present report gives the results of this comparison.

Computed Values Used in the Comparison

The proposed definition of whiteness is:

$$\text{Whiteness} = (R - KS^2)^{1/2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where R = reflectivity

S = distance on the uniform-chromaticity-scale triangle (*2*), between the point representing the standard white, and the point representing the sample, and

K = a constant which is found, from MacAdam's results on the whiteness grading of laundered white goods (*3*), to be 6700 when S^2 is measured as $(\overrightarrow{\Delta r}^2 + \overrightarrow{\Delta g}^2 + \overrightarrow{\Delta b}^2)$ Δr, Δg, and Δb being the corresponding differences in the trilinear coordinates.

In testing this formula three tentative working standards of whiteness were used: (1) magnesium oxide (r = 0.4392, g = 0.4650, b = 0.0958), (2) "natural paper white" (r = 0.4425, g = 0.4662, b = 0.0913), and (3) "intermediate" (r = 0.4402, g = 0.4662, b = 0936). The trilinear coordinates specifying the chromaticity of "natural paper white" and "intermediate" were chosen from examination of the results by visual grading. It seemed from inspection of these results that certain groups of observers were using one or another of these three standards of whiteness, and as will presently appear, this is substantially the case.

In the test of the formula for each of these whiteness standards five values of the constant, K, were used: 0, 5400, 6700, 8000, and infinity. It will be noted that the constant, K, determines how the formula balances chromatic departures from the standard against achromatic departures. For K = 0, the formula takes no account whatever of chromatic departures, whiteness becoming equal simply to the square root of the reflectivity. K = 6700 agrees with MacAdam's results on visual whiteness grading of laundered white goods; K = 5400 and K = 8000 are roughly 20 per cent lower and higher, respectively, than MacAdam's value; for very large values of K the formula gives imaginary values of whiteness for all samples of chromaticity different from that of the standard white. The whiteness order (ranking, arrangement) may in these cases be taken as the inverse order of the squares of the right-hand member of Eq. 1. Since K may be made large enough to mask completely the effect of any difference in reflectivity, it may be said that for K equal to infinity the whiteness order by the formula takes no account whatever of reflectivity.

TABLE I

APPARENT DAYLIGHT REFLECTANCE AND TRILINEAR COORDINATES OF THE 29 SAMPLES ON THE ICI SYSTEM AND ON THE UNIFORM-CHROMATICITY-SCALE TRIANGLE

Illuminant: Standard 1931 ICI illuminant C

Serial Number	Daylight Reflectance	ICI Trilinear Coordinates			Uniform-chromaticity-scale Trilinear Coordinates		
		x	y	z	r	g	b
1	0.845	0.3156	0.3248	0.3596	0.4429	0.4662	0.0909
2	.806	.3165	.3262	.3573	.4435	.4664	.0901
5	.713	.3135	.3201	.3664	.4418	.4649	.0934
6	.802	.3159	.3260	.3580	.4429	.4668	.0903
9	.751	.3129	.3221	.3651	.4408	.4666	.0927
11	.783	.3124	.3206	.3669	.4406	.4660	.0934
13	.771	.3117	.3204	.3679	.4399	.4664	.0937
15	.803	.3184	.3292	.3524	.4448	.4669	.0884
19	.715	.3081	.3143	.3776	.4375	.4653	.0972
20	.725	.3100	.3167	.3733	.4389	.4654	.0957
21	.782	.3154	.3268	.3578	.4423	.4676	.0901
22	.805	.3165	.3271	.3563	.4433	.4670	.0897
25	.761	.3120	.3204	.3675	.4402	.4662	.0936
26	.724	.3121	.3197	.3682	.4404	.4657	.0939
33	.759	.3115	.3196	.3690	.4398	.4661	.0941
34	.786	.3135	.3219	.3646	.4413	.4661	.0926
35	.794	.3144	.3231	.3625	.4420	.4661	.0919
36	.790	.3150	.3239	.3611	.4424	.4662	.0914
37	.802	.3150	.3237	.3613	.4424	.4660	.0915
38	.813	.3181	.3275	.3544	.4448	.4661	.0892
39	.791	.3108	.3190	.3702	.4393	.4662	.0945
40	.810	.3111	.3220	.3669	.4390	.4679	.0931
41	.806	.3078	.3167	.3755	.4368	.4670	.0962
42	.793	.3339	.3439	.3223	.4565	.4645	.0790
45	.779	.3317	.3408	.3275	.4551	.4643	.0807
46	.781	.3294	.3385	.3321	.4534	.4645	.0821
47	.784	.3267	.3339	.3394	.4518	.4636	.0846
48	.802	.3259	.3353	.3388	.4507	.4651	.0842
49	.724	.3220	.3321	.3460	.4476	.4660	.0864
MgO	1.000	.3101	.3163	.3739	.4392	.4650	.0958

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[1] National Bureau of Standards, Washington, D. C.

It should be remarked here that the formula has been tested and validated only for samples that are commonly regarded as white or near-white. The formula does not accord with visual whiteness grading of distinctly non-white samples. For example, paper No. 42 as previously reported *(1)* for magnesium oxide as the whiteness standard and K = 6700, comes out according to the formula with imaginary whiteness. This rates it less white than a perfectly absorbing sample (black) which has zero whiteness according to Eq. 1; such a rating is not in accord with visual grading. This defect could be remedied by a somewhat more complicated formulation, and, perhaps, this may be done in the interest of greater academic accuracy; but, for the present, attention will be directed toward discovering whether the present simple formula accords with visual whiteness grading of samples such as those examined here for which there is a practical interest in determining whiteness.

Table I gives the color specifications of the samples used. Trilinear coordinates are given not only in the coordinate system *(2)* referred to by the formula, but also in the coordinate system adopted in 1931 by the International Commission on Illumination *(4)*. Fig. 1 shows as circles most of these 29 samples plotted by means of their trilinear coordinates on the uniform-chromaticity-scale triangle. The three tentative standard whites are indicated by hexagons. Yellow-blue variations on this triangle are represented approximately by horizontal lines on this diagram, yellow being toward the left and blue toward the right; red-green variations are represented by vertical lines, green being toward the top, and red toward the bottom. It will be noted that the chromaticity variation exhibited by this group of paper samples is chiefly a yellow-blue variation, and vertical scatter being only about one-fourth of the horizontal scatter. Furthermore, most of the samples cluster rather closely about a horizontal line representing the yellow-blue variation.

TABLE II

WHITENESS OF THE SAMPLES COMPUTED FROM EQ. 1 FOR THREE DIFFERENT WHITENESS STANDARDS: (1) MAGNESIUM OXIDE, (2) "INTERMEDIATE," AND (3) "NATURAL PAPER WHITE," AND FOR THREE DIFFERENT VALUES OF THE CONSTANT, K: 5400, 6700, AND 8000

Sample number	Magnesium oxide			"Intermediate"			"Natural paper white"		
	5400	6700	8000	5400	6700	8000	5400	6700	8000
1	0.80	0.76	0.73	0.87	0.86	0.85	0.92	0.92	0.92
2	.72	.67	.62	.82	.80	.78	.89	.89	.89
5	.80	.79	.78	.83	.83	.82	.82	.82	.81
6	.74	.70	.65	.84	.82	.81	.89	.89	.89
9	.82	.81	.80	.86	.86	.86	.85	.85	.84
11	.86	.85	.84	.88	.88	.88	.86	.85	.85
13	.86	.85	.85	.88	.88	.88	.84	.83	.82
15	.57	.45	.28	.73	.69	.64	.85	.84	.83
19	.83	.82	.82	.77	.76	.74	.62	.55	.47
20	.85	.85	.85	.83	.82	.82	.74	.70	.67
21	.72	.67	.62	.82	.81	.79	.87	.87	.87
22	.70	.64	.58	.82	.80	.78	.89	.88	.88
25	.85	.84	.84	.87	.87	.87	.84	.83	.82
26	.83	.83	.82	.85	.85	.85	.81	.80	.79
33	.86	.85	.85	.87	.87	.87	.82	.81	.80
34	.84	.82	.81	.88	.88	.88	.88	.87	.87
35	.82	.80	.77	.87	.87	.86	.89	.89	.89
36	.79	.76	.73	.86	.85	.84	.89	.89	.89
37	.80	.78	.75	.87	.86	.85	.90	.90	.90
38	.63	.55	.44	.77	.73	.69	.87	.87	.86
39	.88	.88	.88	.88	.88	.88	.82	.80	.79
40	.85	.84	.83	.89	.88	.88	.84	.83	.81
41	.87	.86	.85	.84	.82	.81	.70	.64	.58
42	1.53i	1.76i	1.97i	1.36i	1.57i	1.76i	1.07i	1.27i	1.44i
45	1.34i	1.56i	1.75i	1.16i	1.37i	1.55i	.85i	1.04i	1.20i
46	1.14i	1.35i	1.53i	.95i	1.15i	1.31i	.58i	.79i	.94i
47	.87i	1.07i	1.23i	.66i	.85i	1.01i	.10	.39i	.58i
48	.79i	1.00i	1.16i	.54i	.74i	.91i	.39	.00	.40i
49	.37i	.59i	.75i	.39	.10	.36i	.68	.63	.57

Apparent daylight reflectance instead of daylight reflectivity as specified by the formula is given in Table I because, as explained before *(1)*, the observations referred to merely a double thickness of the sample rather than to a pile of a large number of sheets.

The specifications given in Table I are the same as previously reported *(1)* except that paper No. 8 has been omitted. In a redetermination of these specifications after an interval of about a year all samples except No. 8 were found to have changed only by insignificant amounts or by amounts scarcely significant. Sample No. 8, however, had become yellowish enough to change considerably its white-

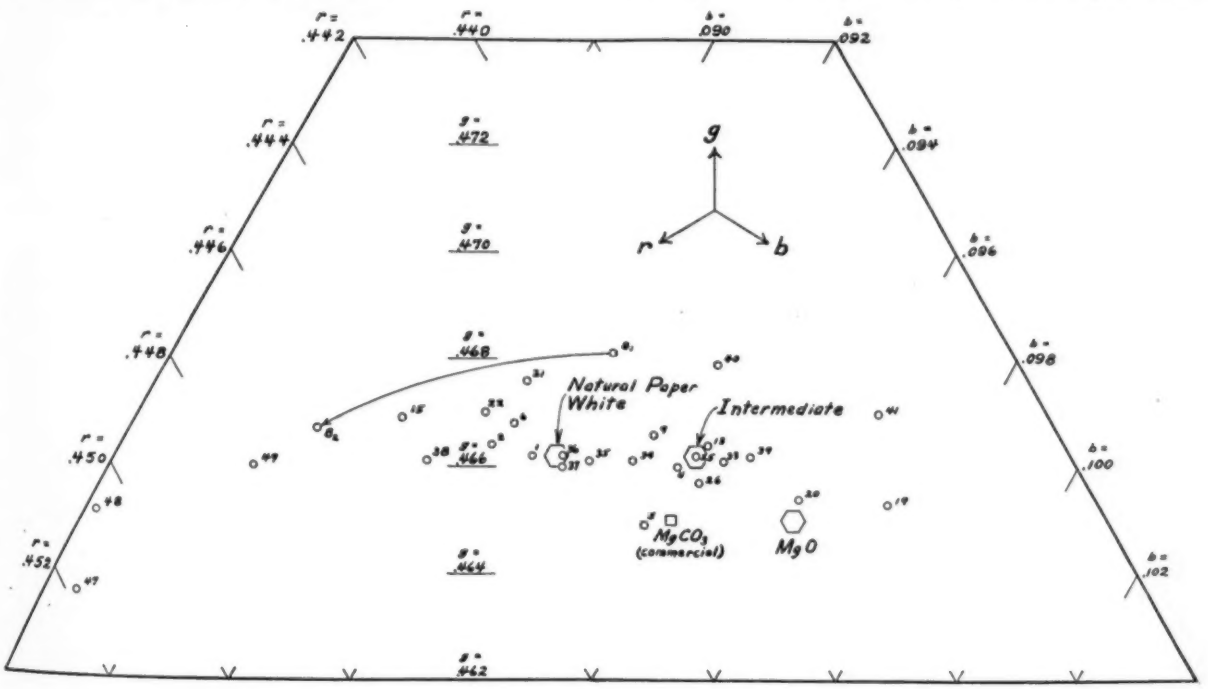

FIG. 1

A portion of the uniform-chromaticity-scale triangle plotted to an enlarged scale showing 27 of the 30 papers. The three tentative standard whites—magnesium oxide, "natural paper white" and "intermediate"—are also represented, together with one sample of commercial magnesium carbonate.

ness rank. On Fig. 1, compare 8_1 with 8_2. Since some of the visual whiteness grading was done nearly three months after the first measurements, the applicability of the first measurement on sample No. 8 is called into serious question; hence this sample was not considered in testing the formula by comparison with visual grading.

Table II gives the whiteness of these 29 samples computed from Eq. 1 for the three tentative standard whites and for K=5400, K=6700 and K=8000, making in all 9 different computed whiteness gradings. Whenever the formula yields imaginary values for whiteness these are recorded by means of the customary symbol, i. which is an abbreviation of $(-1)^{1/2}$; for example, with magnesium oxide as the whiteness standard and for K=6700 sample number 42 has a whiteness of 1.76i which means that for this sample 6700 S^2 (see Table III) exceeded the reflectance (see Table I) by 1.76^2. The interpretation of such an imaginary value is that the sample departs so far from an achromatic color that to give it a whiteness rating has little meaning. Table III gives 6700 S^2 for each of the three tentative standard whites; the inverse rank of these values determines the whiteness order for K equal to infinity.

Table IV gives the whiteness rank of these 29 samples based on the computed values of whiteness given in table 2. The first column gives the identification numbers of the samples arranged nearly in whiteness order for magnesium oxide as the standard white and for K=6700; the remaining columns indicate the whiteness rank of these samples according to the respective whiteness standards and values of K. In the column referring to magnesium oxide as the standard white and to K=6700, the entries would, of course, be in the sequence 1, 2, 3.....29 if the first column had been, as intended, in the exact whiteness order computed for these conditions. Inspection of table 2 shows, however, that for the number of figures given (two) there are several ties in whiteness, as for example, papers 13, 20, and 33, all of which have a whiteness of 0.85; these ties were resolved by reference to the original computations which were carried out to the third decimal in spite of the fact that such small differences are probably affected by the experimental uncertainty of the colorimetric specifications. This method of resolving ties was used throughout. Table IV also shows the whiteness rank of these samples for K=0, this considers reflectance alone (see Table I, column 2); and the table shows further the whiteness rank for K equal to infinity, this considers chromatic departures alone (see Table III).

TABLE III

SQUARES OF THE CHROMATIC DEPARTURES (6700 S^2. SEE EQUATION 1). THE WHITENESS ORDER FOR K EQUAL TO INFINITY IS BASED ON THE INVERSE ORDER OF THESE DEPARTURES

Sample number	Magnesium oxide	"Intermediate"	"Natural paper white"
1	0.26	0.10	0.00
2	.36	.16	.02
5	.08	.03	.05
6	.32	.13	.01
9	.10	.01	.04
11	.06	.00	.06
13	.05	.00	.09
15	.60	.33	.10
19	.03	.14	.41
20	.00	.05	.23
21	.33	.13	.02
22	.39	.17	.02
25	.05	.00	.07
26	.04	.00	.08
33	.03	.00	.10
34	.11	.02	.02
35	.16	.04	.00
36	.21	.07	.00
37	.20	.06	.00
38	.51	.28	.06
39	.02	.01	.14
40	.10	.03	.13
41	.07	.13	.40
42	3.90	3.26	2.40
45	3.22	2.65	1.86
46	2.61	2.10	1.40
47	1.92	1.51	.93
48	1.79	1.35	.80
49	1.07	.71	.33

The basis of arrangement of the 29 samples in these several orders is known from the corresponding formulas. If an observer's selections should be in accord with one or another of these arrangements, it might be concluded, therefore, that the criteria used by him had been found.

Visual Whiteness Grading

The visual results were obtained through the cooperation of three members of the TAPPI Color Committee: Dr. John L. Parsons, Miss Helen U. Kiely, and Mr. B. W. Scribner, and through the cooperation of Mr. W. R. Willoughby. The observers were instructed to arrange the samples in the order of whiteness placing the whitest first and the least white last. Since the first communication *(1)* on this subject had already been presented orally, they had a chance to know that magnesium oxide was tentatively proposed as a whiteness standard, and in some cases the observers were supplied with the whiteness of each sample computed on this basis by Eq. 1. On this account some of them may have been prejudiced in favor of the whiteness ratings based on magnesium oxide as the whiteness standard, but such prejudice is not entirely disadvantageous

TABLE IV.—WHITENESS RANK OF THE 29 SAMPLES COMPUTED FROM EQUATION 1

Serial number	Magnesium oxide				"Intermediate"				"Natural paper white"				Reflectance order, K=0
	5400	6700	8000	∞	5400	6700	8000	∞	5400	6700	8000	∞	
39	1	1	1	2	2	2	2	7	18	20	20	20	13
41	2	2	2	9	14	16	16	18	22	22	22	23	5
13	4	4	4	6	5	5	4	2	15	15	15	16	21
11	5	5	6	8	3	1	1	3	11	11	11	12	17
33	3	3	3	4	9	7	7	5	19	18	18	18	23
20	8	6	5	1	17	15	15	12	21	21	21	21	25
25	7	7	7	7	8	6	6	1	16	14	14	14	22
40	6	8	8	12	1	3	3	10	14	16	16	19	3
26	10	9	9	5	13	12	12	4	20	19	19	15	26
34	9	10	11	13	4	4	5	8	8	8	8	7	15
19	11	11	10	3	21	21	21	19	24	24	24	24	28
9	12	12	12	11	11	10	9	6	13	12	12	10	24
35	13	13	14	14	7	8	8	11	5	5	5	4	11
5	14	14	13	10	16	14	14	9	17	17	17	11	29
37	15	15	15	15	10	11	11	13	2	2	2	2	9
1	16	16	17	17	6	9	10	15	1	1	1	3	1
36	17	17	16	16	12	13	13	14	6	4	3	1	14
6	18	18	18	18	15	17	17	16	3	3	4	5	8
21	20	19	19	19	18	18	18	17	9	9	9	8	18
2	19	20	20	20	19	19	19	20	4	6	6	6	4
22	21	21	21	21	20	20	20	21	7	7	7	9	6
38	22	22	22	22	22	22	22	22	10	10	10	13	2
15	23	23	23	23	23	23	23	23	12	13	13	17	7
49	24	24	24	24	24	24	24	24	23	23	23	22	27
48	25	25	25	25	25	25	25	25	25	25	25	25	10
47	26	26	26	26	26	26	26	26	26	26	26	26	16
46	27	27	27	27	27	27	27	27	27	27	27	27	19
45	28	28	28	28	28	28	28	28	28	28	28	28	20
42	29	29	29	29	29	29	29	29	29	29	29	29	12

because it is valuable to know whether observers are sufficiently doubtful of their judgments to be willing to agree to a whiteness grading according to this specific system. The observations were carried out in the observer's own laboratories under the customary illuminant, presumably daylight, and by his own method. Many of the observers used a block of magnesium carbonate as a guide in the grading.

Table V shows the results by the 15 observers. The first column gives the serial number of the samples nearly in order of whiteness according to Eq. 1 for magnesium oxide as the whiteness standard and for K=6700; it is the same as the first column of Table IV. The remaining columns give the whiteness rank of these samples according to the observers identified by the letters A to P, except that ranking D is the average by four observers (G, J, L, O) who were specifically trying to give a whiteness grading based on magnesium oxide and as much in agreement as possible with that indicated in the first column. The columns G, J, L, and O give their individual rankings as free from prejudice as possible. There is also a column giving the average ranking of the columns A to G in which column D is given a weight 4 and the others weight 1; and another column, the final one, giving the average ranking of the columns H to P. As will appear presently, the basis for this division of the observers is their general agreement on whiteness standard.

A considerable amount of individual difference may be noted in Table V. An attempt at this sort of grading by a novice discloses the extreme difficulty of it; many of the color differences are small almost to vanishing, and the color depends by contrast so much on the colors of the neighboring samples that it might easily be suspected that this much individual difference was purely experimental error. Nevertheless, analysis of these data, as will appear presently, and results of repeated gradings indicate that an experienced observer can largely avoid these sources of error.

Correlation Between Observed and Computed Whiteness

It may be seen by inspection of Tables IV and V that there is some degree of agreement between some of the individual whiteness rankings and certain of the computed rankings. For example, observers A, B, and C, give rankings a good deal like those computed for magnesium oxide as whiteness standard, while observers O and P agree somewhat with "natural paper white" as whiteness standard. As a numerical indication of the degree of agreement between these rankings there have been computed coefficients of correlation by the usual methods; thus, correlation coefficient, r, is defined as:

$$r = 1 - 6\,\Sigma d^2/N(N^2 - 1) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where N is the number of samples arranged in order (here 20, 28, or 29), and d is the number by which each sample in one series differs in ranking from the corresponding sample in the other series. It is immediately evident from Eq. 2 that if an observer should give exactly the same ranking as that computed by one of the formulas, values of d for all samples would be zero and the correlation coefficient, r, would be 1.00; this is the value for perfect positive correlation. It is also true that if the observed order were exactly the reverse of the computed order, values of d would be the maximum possible, and $6\,\Sigma\, d^2/N(N^2 - 1)$ would be found to be equal to 2.00, the constant, 6, being of the right size to make this true. The resulting correlation coefficient, r, is therefore, found by Eq. 2 to be —1.00; this is the value for perfect negative correlation. Similarly r = 0 means no connection between the two arrangements whatever. Interpretations of other values of correlation coefficient for N = 29 are:

Correlation Coefficient, r	Interpretation
0.90	Excellent
.80	Good
.70	Fair
.60	Poor
.50	Scarcely significant

For example, observers C and K were asked to repeat their observations a second day and the correlation was computed for each observer with his own previous arrangement. The values of self-correlation so obtained were 0.95 and 0.92, respectively. A correlation of 0.90 is about all that can be expected for observations of the kind with which we are dealing; it indicates that the basis for the judgment has been discovered with a reliability about equal to that of the data themselves.

An example will make clear the method of applying Eq. 2 to the data of Table V and the computed values of Table IV. Compare observer A with the whiteness ranking computed for magnesium oxide as whiteness standard and for K=6700. Both the formula and observer A ranked sample 39 first; for this sample d = 0. The formula placed sample 41 second, but observer A ranked it third; therefore d=1. Sample 13 was ranked fourth by both; so for this sample d = 0. Similarly for samples 11,

TABLE V.—VISUAL WHITENESS RANKINGS BY 15 OBSERVERS AND AVERAGE RANKINGS BY TWO GROUPS OF THEM

Serial number	A	B	C	D* 4 obs.	E	F	G	Avg. A-G	H	I	J	K	L	M	N	O	P	Avg. H-P
39	1	1	3	1	9	13	12	2	8	12	12	15	9	13	..	13	18	14
41	3	2	1	15	16	11	14	10	4	23	13	1	19	14	17	18	23	18
13	4	..	9	2	11	14	6	4	12	11	14	13	18	16	14	17	17	17
11	2	4	10	4	4	5	2	1	7	10	6	12	9	11	2	6	13	8
33	5	5	8	3	7	6	11	3	16	9	17	14	7	13	11	14	15	13
20	8	3	5	13	13	12	5	9	21	13	15	20	22	19	15	22	19	20
25	7	..	15	7	8	9	17	8	14	7	10	17	5	10	13	12	16	12
40	6	6	2	16	15	20	9	15	6	22	18	22	19	15	20	18	12	18
26	15	..	4	12	12	10	11	12	15	8	11	18	8	17	18	16	20	16
34	10	..	14	5	5	1	13	6	11	1	5	11	6	9	10	7	14	10
19	14	7	6	14	14	19	3	14	22	14	16	21	21	18	16	21	22	21
9	11	8	11	8	9	15	22	16	13	16	9	16	16	19	12	15	10	11
35	9	..	7	6	6	4	15	7	4	2	2	10	4	1	9	8	11	6
5	12	..	16	11	17	3	21	17	23	24	19	19	23	21	19	23	21	23
37	19	..	13	9	2	2	1	5	2	4	1	9	2	7	1	1	7	2
1	13	..	20	18	1	8	4	13	1	5	3	2	1	6	5	2	1	1
36	17	..	12	10	3	7	16	11	3	3	4	8	3	2	3	5	8	3
6	18	10	21	19	21	21	8	19	19	19	7	3	13	4	7	3	2	5
21	16	14	19	17	24	18	28	21	20	15	25	23	17	22	21	20	9	22
2	21	9	22	20	18	16	7	18	18	18	21	4	12	3	6	4	3	4
22	22	12	17	23	19	17	18	20	17	17	8	7	11	8	4	10	6	7
38	23	13	18	22	20	23	19	22	9	6	20	6	15	5	8	9	5	9
15	21	11	23	21	24	22	21	23	10	20	22	5	14	25	22	12	4	15
49	24	15	24	24	23	24	29	24	29	21	26	24	29	23	23	29	24	25
48	25	16	25	26	27	25	25	26	24	27	23	25	24	24	25	26	26	24
47	26	17	27	25	24	28	23	25	28	26	24	28	28	28	24	24	25	26
46	27	18	26	27	26	26	24	27	25	25	27	27	27	26	26	25	27	27
45	29	19	28	28	28	27	27	28	26	28	29	26	26	27	27	27	29	28
42	28	20	29	29	29	29	26	29	27	29	28	29	25	29	28	28	28	29

* Average arrangement by 4 observers (G, J, L, O) using as a guide the ar rangement indicated in the first column.

TABLE VI

DETAILS OF THE COMPUTATION OF COEFFICIENT OF CORRELATION FOR ONE CASE: OBSERVER A COMPARED TO EQ. 1 WITH MAGNESIUM OXIDE AS WHITENESS STANDARD AND WITH K = 6700

Serial number	d	d^2
39	0	0
41	1	1
13	0	0
11	3	9
33	2	4
20	2	4
25	0	0
40	2	4
26	6	36
34	0	0
19	3	9
9	1	1
35	4	16
5	2	4
37	4	16
1	3	9
36	0	0
6	0	0
21	3	9
2	1	1
22	1	1
38	1	1
15	2	4
49	0	0
48	0	0
47	0	0
46	0	0
45	1	1
42	1	1
Total		131

$$r = 1 - 6\,\Sigma d^2/N(N^2 - 1) = 1 - (6 \times 131)/(29 \times 840)$$
$$= 1 - 0.032$$
$$= 0.968$$

33, and 20, d equals 3, 2, and 2, respectively. Table VI gives these and the remaining details of the computation. The first column gives the serial number of the samples, the second gives the corresponding values of d, and the third gives the squares of d. The coefficient of correlation computed by Eq. 2 is seen to be 0.97.

Table VII summarizes the result of the comparison between observed and computed whiteness arrangements; it gives the correlation coefficients for each observer compared to each of the 13 computed arrangements given in Table IV, except for observer B whose incomplete results were compared with only two of the computed arrangements. Table VII (see last two columns) also gives correlation coefficients between the individual arrangements and one of the two average arrangements recorded in Table V.

Derivation of "Natural Paper White"

The correlations for magnesium oxide as whiteness standard were worked out first and it was noted (see Table VII, column 3) that only four of the sixteen observed arrangements agreed strikingly with the computed arrangement. It was also noted (see Table V) that five observers (L, M, N, O, P) having nearly the poorest agreement with magnesium oxide as whiteness standard agreed fairly well among themselves which suggested that they might be grading according to a different whiteness standard. In an effort to discover what this standard might be the average trilinear coordinates of the first three choices of these five observers was computed, weighting first choice 3, second choice 2 and third choice 1. These trilinear coordinates have been taken as pertaining to "natural paper white," so-called because they refer closely to the chromaticity of paper made from good grade, well-bleached, undyed pulp. The high correlations obtained with Eq. 1 using this whiteness standard (see columns 10 to 13, observers, M, N, O, P) is proof that the effort to discover the basis of grading used by these observers has been successful.

Paper stock is frequently tinted with blue, or red dye, or both, to make it "whiter." This reduces its daylight reflectance somewhat but may make it enough closer in chromaticity to magnesium oxide to give it a higher "whiteness" according to Eq. 1. "Natural paper white" may be taken as a name for the closest approach to "white" possible without the addition of dye.

Separation of Observers Into Groups

As an aid to comprehension of these correlations the observers have been arranged in Table VII either in the order of correlation with magnesium oxide as whiteness standard or in inverse order of the correlation with "natural paper white" whichever correlation was best. It was noted that arrangements A to G gave significant correlation (r greater than 0.60) with magnesium oxide as whiteness standard but failed to give such good correlation with "natural paper white" as standard; while the reverse is true of the remaining observers H to P. This is the basis for the groups taken for averaging purposes in Table V; it is also followed in reporting correlation with other observers in Table VII (see last two columns). Closer analysis of the data show, however, that good agreement with Eq. 1 for magnesium oxide as whiteness standard is confined to the first four observed arrangements (A to D); similarly close correlation with "natural paper white" as standard is confined to only a part of the group chosen (H to P). Accordingly observers E to J have been separated from the others to form an "intermediate" group, although observers I to L are so little different in degree of correlation that to place I and J in the "intermediate" group because their correlation coefficients are less than 0.75 is obviously arbitrary. The members of this intermediate group, however, are characterized in general by significant correlation ranging up to fair with either working standard. The suggestion is that they may be grading according to a whiteness standard which is intermediate between magnesium oxide and "natural paper white."

An attempt has been made to discover this "intermediate" whiteness standard. Since many of these observers used magnesium carbonate as a guide in their judgment of whiteness, the first thought is that this should be tried

TABLE VII.—SUMMARY OF CORRELATION COEFFICIENTS

	Magnesium oxide				"Intermediate"				"Natural paper white"				R	Experimental mean	
Obs.	5400	6700	8000	∞	5400	6700	8000	∞	5400	6700	8000	∞	K = O	MgO group	"Natural paper white" group
A	+.97	+.97	+.96	+.88	+.87	+.89	+.89	+.86	+.23	+.23	+.23	+.24	—.13	+.88	
B		+.97								+.41					
C	+.90	+.91	+.91	+.89	+.73	+.73	+.74	+.73	+.16	+.16	+.17	+.19	—.12	+.80	
D (4 obs.)	+.87	+.88	+.87	+.85	+.86	+.91	+.91	+.92	+.36	+.38	+.38	+.44	—.27	+.94	
E	+.71	+.71	+.69	+.68	+.85	+.85	+.84	+.78	+.56	+.59	+.60	+.63	—.02	+.88	
F	+.69	+.69	+.68	+.66	+.76	+.78	+.77	+.77	+.54	+.57	+.58	+.66	—.11	+.84	
G	+.65	+.65	+.64	+.66	+.64	+.61	+.61	+.55	+.46	+.44	+.44	+.39	+.12	+.72	
H	+.56	+.54	+.51	+.40	+.75	+.69	+.68	+.51	+.67	+.67	+.68	+.61	+.50		+.76
I	+.50	+.51	+.49	+.51	+.67	+.67	+.66	+.63	+.65	+.68	+.69	+.70	+.04		+.74
J	+.55	+.55	+.53	+.51	+.74	+.71	+.70	+.64	+.70	+.73	+.74	+.74	+.20		+.83
K	+.33	+.31	+.30	+.22	+.42	+.38	+.36	+.27	+.77	+.77	+.76	+.69	+.56		+.85
L	+.46	+.45	+.43	+.40	+.70	+.68	+.68	+.59	+.77	+.79	+.80	+.80	+.30		+.88
M	+.40	+.38	+.35	+.32	+.60	+.56	+.54	+.43	+.82	+.83	+.83	+.81	+.46		+.92
N	+.43	+.42	+.41	+.40	+.62	+.59	+.59	+.50	+.84	+.85	+.86	+.83	+.32		+.94
O	+.32	+.31	+.31	+.24	+.59	+.54	+.53	+.42	+.91	+.91	+.91	+.85	+.51		+.98
P	+.13	+.11	+.10	+.12	+.41	+.36	+.36	+.27	+.94	+.93	+.92	+.85	+.54		+.86

as a possible whiteness standard. Commercial magnesium carbonate varies somewhat in color presumably because of impurities; furthermore, some samples darken and yellow on exposure to light. However, the trilinear coordinates of a block of commercial magnesium carbonate fairly typical of the samples available here were determined; the corresponding point is indicated by the square on Fig. 1, and suggests that sample No. 5 should be favored if the observers were paying attention to the chromaticity of such a whiteness standard as this. Since inspection of Table V shows that this was true for observer F only, the attempt to correlate observed whiteness gradings with those computed on the basis of magnesium carbonate was given up.

Further similar inspection of Table V and Fig. 1 led to the tentative adoption of a whiteness standard, of the trilinear coordinates labeled on Fig. 1 as "intermediate." Table VII shows the correlations obtained by the use of this whiteness standard in Eq. 1. In four of the seven "intermediate" arrangements (D to J) an improved correlation resulted; these cases may be readily found in Table VII because the highest correlation coefficient for each observer has been put in italics. The improvement is, however, not so striking as that obtained with observers L to P by substituting "natural paper white" for magnesium oxide as whiteness standard; arrangement D, the only instance of excellent correlation with "intermediate" as whiteness standard, has already yielded r=0.88 with magnesium oxide.

Arrangement D as mentioned before is the average for 4 observers using magnesium oxide as a guide in their whiteness grading. Since, contrary to the other observed arrangements, the observers making this arrangement were not permitted to grade according to their usual method, arrangement D has been set apart, The fact that better correlation is obtained with the "intermediate" whiteness standard than with magnesium oxide suggests that the observers were accustomed to grade on the basis of a more yellowish standard such as "intermediate" or even "natural paper white." The correlations obtained for the individual observers of this group (G, J, L, O) substantiate this view; only one of them (G) finds his best correlation with magnesium oxide as whiteness standard and his observations are but poorly accounted for on that basis (r=0.66).

Check of the Constant K.

For each of the three whiteness standards used in Eq. 1 there appears in Table VII correlation coefficients for each of five values of the constant, K: 0, 5400, 6700, 8000 and ∞. It may be seen that for K = 0 (grading on the basis of amount of daylight reflected, no attention paid to chromaticity) only a few instances of significant correlation were found (H, K, O, P) and there were five cases of negative correlation (A, C, D, E, F) apparently indicating that these observers in their whiteness grading penalized a sample reflecting daylight copiously and favored one reflecting less well. Actually, of course, the negative correlation comes in because the samples which approach the chromaticity of magnesium oxide have had their reflectance reduced by dyeing; this is indicated with fair certainty by the high correlation with magnesium oxide and, if necessary, could be shown more elegantly by eliminating this dependence according to the methods of partial correlation. It may be immediately concluded, however, that Eq. 1 describes the method of whiteness grading used by these observers much better for K greater than 5000 than for K = 0; that is, these observers pay very definite attention to chromaticity differences and rather tend to overlook reflectance differences when the two criteria conflict. The choice as between K = 5400, K = 6700, and K = 8000 cannot be made from these data; the differences shown are probably not significant, and the small differences which are shown between the high correlations and which might therefore be thought to be significant vary from one observer to another. Even changing K from 8000 to infinity (grading according to chromaticity alone) generally brings only a small decrease in the correlation. Of the 34 cases involving significant correlations (r greater than 0.50) 25 show lower correlation from K equal to infinity, 2 are unchanged, and 7 increase. The average change for these 34 cases is a decrease of 0.04.

It may be concluded, therefore, that the general form of Eq. 1 has been verified by these data and the value of the constant (6700) suggested by MacAdam's data on whiteness of laundered white goods has been shown to be approximately correct for whiteness grading of near white papers. The exact value of the constant is not known, however; probably any value not differing from 6700 by more than a factor of 2 would give about as good agreement as any other such value.

Agreement Between Observers

The last two columns of Table VII show the correlations of the individual arrangements (except for observer B) with one of two average arrangements, A to G, called the magnesium oxide group, and H to P, called the "natural paper white" group. These correlation coefficients are valuable because they give a clue as to how completely Eq. 1 is successful in representing the basis of whiteness grading used by the various observers. Thus, in seven cases out of the 15 (A, C, D, E, H, I, P) the agreement with the respective group is seen to be either less or not significantly greater than that obtained with one or another of the computed arrangements. It may be said, therefore, that the basis for these seven arrangements has probably been successfully revealed by this analysis. For the remaining 8 observers (F, G, J, K, L, M, N, O) there is a small but probably significant superiority in correlation with the average arrangement; that is, it would appear that these observers (particularly O) agree better with their own average than they do with any of the computed arrangements. Thus, it is suggested that these observers must make some use of a common criterion which has so far escaped formulation.

Three possible explanations of this effect apart from random experimental error are (1) error in choice of a whiteness standard, (2) use of special grading practices confined to observers of one business establishment, and (3) undue penalizing of the few reddish and greenish samples (see Fig. 1, samples 5, 21, and 40) because of contrast with the remainder of the samples which show a predominantly yellow-blue variation.

Error in choice of a whiteness standard could be remedied by making further trials similar to those which resulted in "natural paper white" and "intermediate." There seems little possibility of discovering any whiteness standard that will significantly improve the correlation; it is felt that the exploration already concluded has about exhausted the field.

The use of special grading practices might conceivably arise among observers from one business establishment because whiteness is generally taken as an index of quality and there is a natural tendency to rate one's own product favorably in comparison with competitors' products.

To show, however, that this is not the case for the

present data, it is merely necessary to give the identification of the observers grouped according to their place of employment. There are four such groups: (1) E, F, H, I, M; (2) G, J, L, O; (3) A, C, P; and (4) C, K. It is obvious that there is no close connection between these groups and those chosen according to basis of their whiteness grading.

The third source of error, undue penalizing of reddish and greenish samples (see Fig. 1, samples 5, 21, and 40) because of contrast, is a more likely one. A sample of the larger group showing chiefly a yellow-blue variation may be placed near another sample not differing very much in color, but sample 5, sample 21, or sample 40 cannot be so placed because there are none such in the group of 20 papers. The result may very well be that they do not seem to belong anywhere in the whiteness series; and if either of the greenish samples (21 or 40) be placed next to the reddish one (5) both the greenish and reddish will gain in saturation and hence will seem to require a lower whiteness grading. Examination of Tables IV and V confirms the view that much of the failure of Eq. 1 to account completely for whiteness grading by direct visual comparison is ascribable to this cause. Note that sample 5 is rated about 15 by Eq. 1, but observers G to J rate it no better than 19; similarly sample 21 is rated 9 by Eq. 1 for "natural paper white" as standard, but observers K to O who otherwise agree with Eq. 1 rate it no better than 17; and similarly again sample 40 is rated 3 by Eq. 1 with the "intermediate" standard, but observed arrangements D, E, F, I, and J which otherwise agree fairly well with this computed arrangement rate it no better than 15. This suggests strongly that further experimental work with a group of samples varying less preponderantly in the yellow-blue sense might result in higher correlation with Eq. 1.

Definition of Whiteness

The results of Table VII suggest that whiteness might be defined in terms of magnesium oxide as a standard without doing great violence to present practice. Observers A, B, and C already grade in good accord with this standard, observer C not significantly less so than A and B in spite of the higher correlation coefficient, because observers A and B were given the whiteness grading by Eq. 1 as a guide which probably accounts for the near perfection of the correlation. Four other observers (G, J, L, O) as a group (arrangement D) are willing to agree substantially to the arrangement found for magnesium oxide as whiteness standard when presented with it in spite of the fact that three of them are accustomed to grade whiteness according to a yellower standard.

The results of this table also suggest that a definition of "natural paper white" following the form of Eq. 1 might also be useful. Five observers obtain correlation coefficients of 0.80 or better with this standard, and it is likely that if the other observers were instructed to grade in accord with degree of resemblance to good grade, well-bleached, undyed stock and were supplied with the computed arrangement according to "natural paper whiteness" as a guide, equally good or better agreement would be found as that with magnesium oxide as whiteness standard.

The agreement found with the tentative "intermediate" standard is probably to be ascribed to whiteness grading according to a criterion varying between the other two standards; no real basis for a separate standard seems to be indicated.

Summary

It may be concluded from the results shown here that much of the trouble and disagreement heretofore arising in whiteness grading of near-white papers is ascribable to the existence among those expert in grading paper of at least two distinct bases for judging whiteness. Judgments by the first basis will be called simply "whiteness" judgments; whiteness is defined as the degree of approach to the appearance of a perfectly reflecting, perfectly diffusing surface. Judgments by the second basis will be called judgments of "natural paper whiteness"; this is defined as the degree of approach to the appearance of paper made from good grade, well-bleached, undyed pulp.

It is, therefore, recommended that magnesium oxide ($r = 0.4392$, $g = 0.4650$, $b = 0.0958$) be taken as a standard white, and that "whiteness" be measured by degree of approach to this standard according to Eq. 1 for $K = 6700$.

It is further recommended that the trilinear coordinates ($r = 0.4425$, $g = 0.4662$, $b = 0.0913$) be taken tentatively as a standard natural paper white, and that "natural paper whiteness" be measured as the degree of approach to this standard according to Eq. 1 for $K = 6700$.

It is also recommended that the relation between reflectance for blue light (measured by the "brightness tester") and both "whiteness" and "natural paper whiteness" be investigated. There is considerable promise that interesting and valuable correlations will be discovered.

Literature Cited

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(2) Judd, D. B., "A Maxwell Triangle Yielding Uniform Chromaticity Scales," *J. Opt. Soc. Am.*, 25:24-35 (1935); J. Res. Bur. Stds., 14:41-57 RP-756 (1933).
(3) MacAdam, D. L., "The Specification of Whiteness," *J. Opt. Soc. Am.*, 24:188-191 (1934).
(4) Judd, D. B., "The 1931 ICI Standard Observer and Coordinate System for Colorimetry," *J. Opt. Soc. Am.*, 23:359-374 (1933).

British Paper Industry Improves

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 18, 1936.—Conditions in the paper industry in the United Kingdom during the first quarter of 1936 continued to be good and the opinion was generally expressed that the paper mills were in a better position than in the same period in 1935. At the end of the first quarter, many mills had orders on file to insure their operating at capacity for many weeks ahead.

Indicating the greater activity in the paper market, imports of paper base stocks during the first three months of 1936 reached a total of 514,145 tons as against 479,181 tons during the corresponding period of 1935. All prices of pulp, except ground wood pulp, contributed to this increase.

The consumption of paper in the United Kingdom had been stimulated by the advertising campaigns carried on over the past few months. In order to bring the public to the realization of the benefit and profit in the use of papers of higher quality, the paper makers of the United Kingdom have been cooperating in an advertising scheme known generally as the "Better Paper Campaign." The aim is to sell better papers at better prices. Complaint is voiced by the manufacturers that printers and merchants in order to increase retail sales are prone to cut down on qualities and prices.

As a further indication of the efforts of British paper manufacturers to increase the consumption of their products, a new use for paper was advertised at the British Industries Fair held in February. One exhibit showed paper combined with synthetic resin to make a material especially adapted for use as panels for table tops, etc. A parchment paper for use in connection with films was another departure.

IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING AUGUST 15, 1936

CIGARETTE PAPER

Champagne Paper Corp., *Ile de France,* Havre, 800 cs.; Standard Products Corp., *Ile de France,* Havre, 54 cs.; R. J. Reynolds Tobacco Co., *Pr. Harding,* Havre, 133 cs.

WALLPAPER

——— *American Merchant,* London, 9 cs.; S. K. Lonegren, *Kungsholm,* Gothenburg, 5 bxs.

WALLBOARD

Johaneson Wales & Sparre, Inc., *Kungsholm,* Gothenburg, 43 bdls.

NEWSPRINT

Jay Madden Corp., *Kolsnaren,* Kotka, 300 rolls; Brooklyn Times, *Kolsnaren,* Norrkoping, 357 rolls; Gilman Paper Co., *Kolsnaren,* Norrkoping, 764 rolls; Perkins Goodwin & Co., *Berlin,* Bremen, 220 rolls; Jay Madden Corp., *Berlin,* Bremen, 271 rolls; Jay Madden Corp., *Scanyork,* Kotka, 615 rolls; Jay Madden Corp., *Pr. Harding* Hamburg 100 rolls; Jay Madden Corp., *Columbus,* Bremen, 130 rolls; Perkins Goodwin & Co., *New York,* Hamburg, 34 rolls; ——— *Stavangerfjord,* Skien, 859 rolls.

PRINTING PAPER

Victory Shipping Co., *Ile de France,* Havre, 7 bls.; Phoenix Shipping Co., *New York,* Hamburg, 7 cs.

WRAPPING PAPER

C. Bloom, Inc., *American Merchant,* London, 1 cs.; Lincoln Import Specialties Corp., *Kungsholm,* Gothenburg, 526 rolls; Guaranty Trust Co., *Kungsholm,* Gothenburg, 134 bls., 1652 rolls; American Manfg. Co., *Kungsholm,* Rauma, 6 rolls; Heemsoth Pinkus & Kerner, *Berlin,* Bremen, 44 bls.; Phoenix Shipping Co., *New York,* Hamburg, 2 cs.; ———, *Columbus,* Bremen, 9 cs.

FILTER PAPER

J. Manheimer, *Queen Mary,* Southampton, 93 bls., 1 cs.; H. Reeve Angel & Co. Inc., *Queen Mary,* Southampton, 10 bls., 1 cs.; H. Reeve Angel & Co. Inc., *American Merchant,* London, 5 cs; A. Giese & Son, *New York,* Hamburg, 1 cs.

FILTER COMPOUND

H. Reifenberg, *New York,* Hamburg, 40 cs.

DRAWING PAPER

Donald Teague, *Queen Mary,* Southampton, 1 cs.; H. Reeve Angel & Co. Inc., *American Merchant,* London, 7 cs.; Hillman Importing & Trading Co., Inc., *American Merchant,* Havre, 2 cs.; Lansen Naeve Co., *Berlin,* Bremen, 3 cs.

BARYTA COATED PAPER

Globe Shipping Co., *Berlin,* Bremen, 88 crates, 1 cs.

SURFACE COATED PAPER

C. Happel, *Pr. Harding,* Hamburg, 1 cs.; C. Happel, *New York,* Hamburg, 2 cs.; Gevaert Co., of America, *Black Tern,* Antwerp, 29 cs.

METAL COATED PAPER

F. C. Gerlach Co., *Columbus,* Bremen, 1 cs.

PHOTO PAPER

J. J. Gavin, *Queen Mary,* Southampton, 8 cs.

DECALCOMANIAS

B. F. Drakenfeld & Co., *Scythia,* Liverpool, 40 cs. (duplex); Sellers Transportation Co., *Columbus,* Bremen, 23 cs.

COLORED PAPER

International F'd'g. Co., *New York,* Hamburg, 1 cs.; D. C. Andrews & Co., *Columbus,* Bremen, 1 cs.

STRAW BOARDS

———, *Maasdam,* Rotterdam, 70 rolls.

MISCELLANEOUS PAPER

Keller Dorian Paper Co., *Pr. Polk,* Marseilles, 4 cs.; The Borregaard Co. Inc., *Kungsholm,* Gothenburg, 2354 rolls, 106 bls.; Guaranty Trust Co., *Kungsholm,* Gothenburg, 453 rolls, 53 bdls.; ——— *Kungsholm,* Gothenburg, 85 rolls; F. L. Kramer & Co., *Kungsholm,* Gothenburg, 240 bls.; Walker Goulard Plehn Co., *Kungsholm,* Gothenburg, 12 rolls; Sandvik Steels, Inc., *Kungsholm,* Gothenburg, 1 cs.; Japan Paper Co., *Kungsholm,* Gothenburg, 1 cs.; Japan Paper Co., *Ile de France,* Havre, 1 cs.; Coty Processing Co., *Ile de France,* Havre, 3 cs.; Japan Paper Co., *G. Maersk,* Kobe, 51 cs. Jay Madden Corp., *New York,* Hamburg, 56 bbls.; ———, *New York,* Hamburg, 253 bls., 312 rolls; ———, *Katsuragi Maru,* Kobe, 3 cs.

RAGS, BAGGINGS, ETC.

Mitsui & Co. Ltd., *Tenyo Maru,* Kobe, 300-bls. cotton waste; ———, *American Shipper,* Manchester, 53 bls. paper stock; ———, *American Shipper,* Manchester, 32 bls. rags; Chase National Bank, *Hokkai Maru,* Shanghai, 128 bls. bagging; Manufacturers Trust Co., *Hokkai Maru,* Osaka, 126 bls. rags; Royal Manfg. Co., *Venice Maru,* Shanghai, 100 bls. cotton waste; Guaranty Trust Co., *Venice Maru,* Kobe, 35 bls. rags; E. J. Keller Co. Inc., *Venice Maru,* Kobe, 133 bls. rags; J. Cohen Son & Co. Inc., *American Merchant,* London, 15 bls. rags; Chase National Bank, *American Merchant,* London, 38 bls. rags; ———, *American Merchant,* London, 38 bls. rags; Manufacturers Trust Co., *Scythia,* Liverpool, 6 bl. rags; J. Cohen Son & Co. Inc., *Scythia,* Liverpool, 12 bls. rags; Castle & Overton, Inc., *Argentino,* Montevideo, 88 bls. rags; Castle & Overton, Inc., *Argentino,* Buenos Ayres, 151 bls. bagging; J. T. Flannery, *Sarcoxie,* Havre, 323 bls. rags; J. Eisenberg, *Sarcoxie,* Dunkirk, 13 bls. bagging; ———, *Berlin,* Bremen, 90 bls. cotton waste; Brandwein Mazur Co., *G. Maersk,* Shanghai, 200 bls., picker waste; Chase National Bank, *G. Maersk,* Kobe, 55 bls. rags; Philadelphia National Bank, *Gerolstein,* Antwerp, 282 bls. rags; Continental Bank Trust Co., *Black Tern,* Antwerp, 93 bls. bagging; Kaplan & Co., *Black Tern,* Antwerp, 5 bls. rags; R. Blank,

Black Tern, Antwerp, 91 bls. rags; E. J. Keller Co. Inc., *Black Tern,* ————, 56 bls. rags; E. J. Keller Co. Inc., *Estrella,* ————, 229 bls. rags; E. J. Keller Co. Inc., *Westernland,* ————, 98 bls. rags; E. J. Keller Co Inc., *City of Salisbury,* ———— 50 bls. paper stock; E. J. Keller Co. Inc., *Pr. Polk,* ————, 60 bls. paper stock.

OLD ROPE

Manufacturers Trust Co., *American Merchant,* London, 64 coils.

CHINA CLAY

English China Clays Sales Corp., *Scythia,* Liverpool, 67 bags.

CASEIN

Balfour Guthrie & Co., *Scythia,* Liverpool, 333 bags; ————, *Sarcoxie* Havre, 300 bags; T. M. Duche & Sons, *Pan American,* Buenos Ayres, 250 bags; ————, *Pan America,* Buenos Ayres, 1835 bags; ————, *New York,* Hamburg, 70 bags.

WOOD PULP BOARDS

H. Fuchs & Son, *Kungsholm,* Gothenburg, 49 crates; Fibre Case & Novelty Co. Inc., *Kungsholm,* Gothenburg, 15 bls.; Salwen Paper Co., *Kungsholm,* Gothenburg, 33 bls.; Jay Madden Corp., *Kolsnaren,* Viipuri, 105 bls.; Jay Madden Corp., *Kolsnaren,* Kotka, 135 bls., 710 rolls; G. F. MacFadden & Bro., *New York,* Hamburg, 24 bls.

WOOD PULP PASTE BOARDS

Fibre Produces Manfg. Co., *Pr. Harding,* Hamburg, 18 bls.

WOOD PULP SHEETS

————, *New York,* Hamburg, 100 bls.

WOOD PULP

D. M. Hicks, Inc., *Kungsholm,* Gothenburg, 300 bls. chemical pulp; Castle & Overton, Inc., *Kolsnaren,* Viipuri, 130 bls. dry pulp; Lagerloef Trading Co., *Kolsnaren,* Rauma, 585 bls. sulphite; Brown Bros. Harriman & Co., *Kersten Miles,* Hernosand, 1200 bls. sulphite, 200 tons; Brown Bros. Harriman & Co., *Kersten Miles,* Hernosand, 4223 bls. sulphate, 703 tons; ————, *Kersten Miles,* Hernosand, 3450 bls. sulphate, 575 tons; ————, *Kersten Miles,* Stugsund, 500 bls. sulphite, 100 tons; ————, *Kersten Miles,* Stugsund, 750 bls. sulphate, 150 tons; Bulkley Dunton & Co., *Kersten Miles,* ————, 5475 bls. wood pulp; Mead Sales Co. Inc., *Kersten Miles,* Sundsvall, 210 bls. chemical pulp, 42 tons; Mead Sales Co. Inc., *Kersten Miles,* Sundsvall, 210 bls. sulphite, 42 tons; Johaneson Wales & Sparre, Inc., *Kersten Miles,* Sundsvall, 400 bls. sulphite, 75 tons; A. Giese & Son, *Maasdam,* Rotterdam, 20 bls. wood pulp; ————, *New York,* Hamburg, 258 bls. wood pulp, 40 tons; Irving Trust Co., *Stavangerfjord,* Oslo, 1003 bls. mechanical pulp; J. Andersen & Co., *Stavangerfjord,* Oslo, 1915 bls. sulphite; The Borregaard Co. Inc., *Stavangerfjord,* Sarpsborg, 504 bls. sulphate.

NEWARK IMPORTS

WEEK ENDING AUGUST 15, 1936

H. G. Craig Co., *Donpaco* Donnacona, 331 rolls newsprint; H. G. Craig Co., *Newscarrier,* Donnacona, 330 rolls newsprint.

ALBANY IMPORTS

WEEK ENDING AUGUST 15, 1936

International Paper Co., *Utsire,* Newcastle, N. B., 2800 cords pulpwood.

BOSTON IMPORTS

WEEK ENDING AUGUST 15, 1936

Stone & Downer Co., *Scythia,* Liverpool, 1 cs. paper; F. S. Webster Co. Inc., *Scythia,* Liverpool, 8 cs. tissue paper; ————, *Scythia,* Liverpool, 13 bls. rags; ————, *Scythia,* Liverpool, 4 cs. wafer paper; G. F. Malcolm, Inc., *Scythia,* Liverpool, 55 cs. tissue paper; ————, *Sarcoxie,* Havre, 28 bls. rags; Irving Trust Co., *Sarcoxie,* Havre, 39 bls. cotton waste; Irving Trust Co., *Sarcoxie,* Havre, 67 bls. waste sisal; Ayres W. C. Jones Co., *Sarcoxie,* Havre, 37 bls. cotton waste; Lucas Henkels Co., *Sarcoxie* Dunkirk, 26 bls. rags; ————, *Sarcoxie,* Dunkirk, 83 bls. rags; J. T. Lodge Co. Inc., *Sarcoxie,* Dunkirk, 20 bls. thread waste; ————, *Maasdam,* Rotterdam, 5 bls. rags; ————, *Maasdam,* Rotterdam, 128 rolls straw boards; C. H. Powell Co., *Maasdam,* Rotterdam, 120 bls. cotton waste; R. Butterworth & Co. Inc., *Maasdam,* Rotterdam, 37 bls. rags; Parsons & Whittemore, Inc., *Konigsberg,* ————, 525 bls. wood pulp; Gottesman & Co. Inc., *Nordnes,* Sweden, 1500 bls. wood pulp.

PORTLAND IMPORTS

WEEK ENDING AUGUST 15, 1936

J. Andersen & Co., *Kersten Miles,* Sundsvall, 3000 bls. sulphate 500 tons; ————, *Kersten Miles,* Hernosand, 2400 bls. sulphate 400 tons; Gottesman & Co. Inc., *Kersten Miles,* Sweden, 4800 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING AUGUST 15, 1936

Philadelphia National Bank, *Hokkai Maru,* Shanghai, 200 bls. cotton waste; E. J. Keller Co. Inc., *Exmouth,* ————, 73 bls. rags; T. M. Duche & Sons, *Argentino,* Buenos Ayres, 417 bags casein; Philadelphia Inquirer, *Kolsnaren,* Norrkoping, 472 rolls newsprint; Jay Madden Corp., *Kolsnaren,* Viipuri, 35 bls. wood pulp boards; Jay Madden Corp., *Kolsnaren,* Kotka, 167 bls. wood pulp boards; Lagerloef Trading Co., *Kolsnaren,* Rauma, 1100 bls. sulphite; Lagerloef Trading Co., *Kolsnaren,* Rauma, 130 bls. mechanical pulp; J. W. Hampton Jr. & Co., *Scanyork,* Kotka, 471 rolls newsprint; ————, *G. Maersk,* Kobe, 708 bls. rags; Asano Bussan Co., *G. Maersk,* Yokohama, 30 bls. rags; E. J. Keller Co. Inc., *Maasdam,* ————, 229 bls. rags; Gottesman & Co. Inc., *Svaneholm,* Sweden, 6000 bls wood pulp.

WILMINGTON IMPORTS

WEEK ENDING AUGUST 15, 1936

Lagerloef Trading Co., *Kolsnaren,* Viipuri, 6200 bls. sulphite; Lagerloef Trading Co., *Kolsnaren,* Rauma, 2152 bls. sulphite; Jay Madden Corp., *Kolsnaren,* Kotka, 133 rolls newsprint; Castle & Overton, Inc., *Scanyork,* Wiborg, 3756 bls. wood pulp, 751 tons; Lagerloef Trading Co., *Scanyork,* Wiborg, 1750 bls. sulphite 350 tons; Perkins Goodwin & Co., *Scanyork,* Gdynia, 485 bls. wood pulp 75 tons.

CAMDEN IMPORTS

WEEK ENDING AUGUST 15, 1936

Lagerloef Trading Co., *Scanyork,* Wiborg, 5131 bls. sulphate pulp 1026 tons.

BALTIMORE IMPORTS

WEEK ENDING AUGUST 15, 1936

Congoleum Nairn Co., *Exmouth,* Valencia, 539 bls. rags; ————, *Kersten Miles,* Hernosand, 300 bls. sulphate 50 tons; Brown Bros. Harriman & Co., *Kersten Miles,* Hernosand, 300 bls. sulphate 50 tons; Brown Bros. Harriman & Co., *Kersten Miles,* Hernosand, 300 bls. sulphite 50 tons; Johaneson Wales & Sparre, Inc., *Kersten Miles,* Sundsvall, 975 bls. sulphite 175 tons; Johaneson Wales & Sparre, Inc., *Kersten Miles,* Sundsvall, 1500 bls. sulphate 250 tons; Bulkley Dunton & Co., *Kersten Miles,* ————, 4775 bls. wood pulp, 955 tons; Mead Sales Co. Inc., *Kersten Miles,* Sundsvall, 6852 bls. sulphite 1142 tons; ————, *Kersten Miles,* Stugsund, 1000 bls. sulphate 200 tons; ————, *Kersten Miles,* Stugsund, 2250 bls. sulphate 450 tons; Par-

(Continued on page 47)

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, August 19, 1936.

Conditions in the local paper market are favorable for the time of year. Demand for the various grades of paper is holding up well. Sales forces of the leading paper organizations are generally optimistic regarding the future trend of the industry. Prices are steady and unchanged.

The newsprint paper market is exhibiting a fairly strong undertone. The International Paper Company has followed the lead of the Great Northern Paper Company in announcing that its price for 1937 will be $42.50 per ton, delivered. Leading Canadian manufacturers have not yet announced their quotations.

Business in the fine paper market is well up to average for the season. Demand for book, cover, bond and ledger papers is fairly well sustained. Prices are steady. Tissues are going forward in good volume. The coarse paper market is firm, with summer specialties in excellent request. Demand for box board is improving.

Mechanical Pulp

The position of the ground wood pulp market is practically unchanged, although the trend is stronger, due to the unusually dry summer experienced so far this year. Manufacturing operations in the United States and Canada are proceeding in sufficient volume to take care of current requirements.

Chemical Pulp

While no radical changes transpired in the chemical pulp market the prevailing sentiment among the producers is optimistic. Bleached sulphite and kraft pulps continue to display strength. Paper manufacturers are at present evincing more interest in unbleached sulphite, especially the bleachable grades.

Old Rope and Bagging

The old rope market continues dull. Demand for imported and domestic old manila rope is only moderately active. Mixed string is fairly steady. Old rope prices remain unchanged. Offerings of bagging are limited. Demand for scrap and gunny bagging is fairly persistent. Roofing bagging is showing some improvement.

Rags

Most of the business transacted in the domestic rag market is along routine lines. While domestic demand for new and old cotton rags is light there is a fairly persistent export request, especially for No. 1 white shirt cuttings and other white cotton grades. The imported rag market is listless, with prices nominal.

Waste Paper

The paper stock market continues to show signs of improvement. Demand from the board mills for the lower grades of waste paper is more lively and quotations on strictly folded news and No. 1 mixed paper are firmer. The higher grades of paper stock are steady, with prices holding to formerly quoted levels, in most instances.

Twine

Demand for the various varieties of twine is considered satisfactory for the season and dealers are looking forward to the customary expansion of trading between now and the end of the year, at least. At the present time there are a good number of inquiries around for future needs, which should materialize into sizable orders.

Quaker City Paper Jottings

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., August 17, 1936.—With the consumption of paper in the waste paper industry at a high point and board mills reported to be working 74 per cent of their capacity—which is quite an advance over the average for the last two or three years—waste paper merchants are feeling very much reassured, and it seems reasonable to expect that this stimulus will continue by reason of the fact that there is no accumulation in this market.

The directors of the Philadelphia Paper and Cordage Association met with president George K. Hooper at Graffs' Restaurant on Thursday evening, August 13. After dinner was served the directors went into action to formulate plans for augmenting the membership of the Association to 100 before the fall meeting, which will be held on September 18th at the Hotel Adelphia.

E. K. Lay, chairman of the Entertainment Committee, outlined his plans of entertainment for the Fall, including the shad dinner, which has become an annual event with the association. Program for the regular monthly meeting during the year was also discussed.

IMPORTS OF PAPER AND PAPER STOCK

(Continued from page 46)

sons & Whittemore, Inc., *City of Baltimore,* ————, 680 bls. wood pulp.

NEW ORLEANS IMPORTS

WEEK ENDING AUGUST 15, 1936

Loumar Textile By Products Co., *Venice Maru,* Kobe, 400 bls. bagging; E. J. Keller Co. Inc., *Aussa* ————, 185 bls. paper stock.

GALVESTON IMPORTS

WEEK ENDING AUGUST 15, 1936

———— *Venice Maru,* Kobe, 40 bls rags.

DETROIT IMPORTS

WEEK ENDING AUGUST 15, 1936

Price & Pierce, Ltd., *Vardefjell,* ————, 100 tons bleached sulphite.

ORANGE, TEXAS, IMPORTS

WEEK ENDING AUGUST 15, 1936

Johaneson Wales & Sparre, Inc., *Kersten Miles,* Obbola, 3500 bls. sulphate 500 tons; Johaneson Wales & Sparre, Inc., *Kersten Miles,* Sundsvall, 3000 bls. sulphate 500 tons.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, August 19, 1936.

BLANC FIXE.—Conditions in the blanc fixe market are fairly satisfactory. Prices are generally holding to schedule. The pulp is quoted at $42.50 to $45 per ton, in bulk; while the powder is selling at 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER.—The position of the bleaching powder market is practically unchanged. Contract shipments are going forward regularly. Prices are steady. Bleaching powder is quoted at $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN.—The casein market continues firm. Domestic standard ground is quoted at 16¾ and finely ground at 17 cents; while French and Argentine standard ground are selling at 17 and finely ground at 17½ cents per pound, all in bags, car lot quantities.

CAUSTIC SODA.—Paper mill demand for caustic soda is moderately active. The contract movement is normal. Prices are steady. Solid caustic soda is quoted at $2.55 to $2.60; while the flake and ground are selling at $2.95 to $3 per 100 pounds, in drums, at works.

CHINA CLAY.—The china clay market is displaying strength. Prices are holding to formerly quoted levels. Imported china clay is selling at $12.50 to $21 per ton, ship side; while domestic paper making clay is offered at $6.50 to $12 per ton, at mine.

CHLORINE.—Steadiness prevails in the chlorine market. Demand from the paper mills is well sustained. The contract movement is well up to average. Prices are firm. Chlorine is quoted at $2.15 to $2.55 per 100 pounds, in tank cars, at works.

ROSIN.—The rosin market continues strong. Paper making gum rosin is quoted at $6.05 and wood rosin at $6.15 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $2.95 per 100 pounds, in tank cars, at works.

SALT CAKE.—Demand for salt cake is fairly brisk. Contract shipments are moving freely. Salt cake is still quoted at $12 to $13; chrome salt cake at $11 to $12 per ton, at works; while imported salt cake is selling at $12 to $13 per ton, ship side.

SODA ASH.—The soda ash market is exhibiting a strong undertone. Shipments against contract are moving in good volume. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH.—The starch market continues firm, due to the high prices of raw materials. Contract shipments are normal for the season. Special paper making starch is quoted at $4 per 100 pounds, in bags; and at $4.27 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA.—No radical changes transpired in the sulphate of alumina market. The contract movement is seasonal. Prices remain unchanged. Commercial grades are quoted at $1.35 to $1.60; and iron free at $2 to $2.25 per 100 pounds, in bags, at works.

SULPHUR.—The sulphur market continues steady. Yearly contracts are quoted at $18 per ton, in bulk, on orders of 1,000 tons, or over, and $20 on smaller quantities. On spot and nearby car loads the quotation is $21 per ton. All quotations are in car lots, at works.

TALC.—Business in the talc market is holding up well. The contract movement is normal. Prices are holding to schedule. Domestic talc is quoted at $16 to $18 per ton, at eastern mines; while imported talc is selling at $23 to $30 per ton, on dock.

Market Quotations

Paper

Rag Content Bond & Ledgers— Delivered Zone 1	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers— Delivered Zone 1	Bonds	Ledgers
No. 1 Sulphite	7.50 @ 8.50	
No. 2 Sulphite	6.50 @ 7.50	
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50
Book, B Grade, Cased		
S. & S. C.	5.85 @ 6.60	
S. & S. C. Litho.	6.10 @ 6.85	
M. F.	5.60 @ 6.35	
No. 4 Grade		
Coated and Enamel	6.80 @ 7.65	
Coated Litho	6.80 @ 7.65	

Tissues—Per Ream—	
White No. 1	.82½ @ —
White No. 1 M. G.	.77½ @ —
White No. 1½	.62½ @ —
White No. 2	.60 @ —
Anti-Tarnish M. G.	.67½ @ —
Colored	.80 @ —
Kraft	.67½ @ —
Manila	.60 @ —
Unbleached Toilet	2.60 @ 3.30
Bleached Toilet	3.94 @ 5.26
Paper Towels—	
Unbleached	2.10 @ 3.35
Bleached	3.30 @ 3.70
Manila—	
No. 1 Jute	9.00 @ 9.25
No. 2 Jute	7.75 @ 8.50
No. 1 Wood	4.00 @ 5.25
No. 2 Wood	3.50 @ 4.00
Fibre Papers—	
No. 1 Fibre	4.25 @ 5.50
No. 2 Fibre	4.00 @ 4.75

(Delivered New York)

News, per ton—	
Roll, contract	41.00 @ —
Sheets	46.00 @ —
Kraft—	
No. 1 Northern	4.25 @ 4.75
Standard	4.12½ @ —
Southern	4.00 @ —
Boards—per ton—	
News	32.50 @35.00
Chip	32.50 @35.00
Sgl. Mla. Ll. Chip.	45.00 @47.50
Jute Lined Chip	42.50 @45.00
Kraft Liners	60.00 @62.50
White Pat. Coated.	57.50 @60.00
Binders Boards	67.00 @75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—	
Moist	24.00 @25.00
Dry	24.00 @25.00

(Delivered)

No. 1 Domestic and Canadian	27.00 @28.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—	
Division 1	2.70 @ 3.30
Division 2	2.65 @ 2.75
Division 3	2.60 @ 2.70
Prime Qualities—	
Class 1. All Prime Easy Bleaching	2.05 @ 2.10
Other Than Easy Bleaching—	
Class 2. Higher than Standard	2.00 @ 2.05
Class 3, Standard	1.95 @ 2.00
Class 4. Lower than Standard	1.90 @ 1.95

(On Dock, Atlantic Ports)

Kraft Bleached	3.00 @ 3.25
Kraft Light & Strong	2.10 @ 2.20
Kraft No. 1	1.85 @ 2.10
Kraft No. 2	1.70 @ 1.85

(F. o. b. Pulp Mill)

Kraft Domestic	1.80 @ 2.00

(Delivered)

Soda Bleached	2.60 @ —

* Add 60 Cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—	
New White, No. 1.	7.50 @ 7.75
Silesias No. 1	5.50 @ 5.75
New Unbleached	8.25 @ 8.50
New Soft Blacks	3.75 @ 4.00
Blue Overall	6.50 @ 6.75
Fancy	3.00 @ 3.25
Washables	2.25 @ 2.50
Mixed Khaki Cuttings	3.50 @ 3.75
O. D. Khaki Cuttings	4.25 @ 4.50
Men's Corduroy	2.00 @ 2.25
New Mixed Blacks	2.75 @ 3.00

Old Rags

White, No. 1—	
Repacked	3.25 @ 3.50
Miscellaneous	2.75 @ 3.00
White, No. 2—	
Repacked	2.25 @ 2.50
Miscellaneous	1.75 @ 2.00
Thirds and Blues—	
Repacked	2.00 @ 2.25
Miscellaneous	1.90 @ 2.00
Roofing Rags—	
No. 1	1.75 @ 1.80
No. 2	1.15 @ 1.25
No. 3 (bagging)	1.10 @ 1.15
No. 4	1.10 @ 1.15
No. 5A	.80 @ .90

Foreign Rags

New Rags

New Dark Cuttings	2.25 @ 2.50
New Mixed Cuttings	2.00 @ 2.25
New Light Silesias	4.50 @ 5.00
Light Flannelettes	4.50 @ 5.00
New White Cuttings	7.00 @ 7.50
New Light Oxfords	4.00 @ 4.50
New Light Prints	3.00 @ 3.25

Old Rags

No. 1 White Linens	7.50 @ 8.00
No. 2 White Linens	6.50 @ 7.00
No. 3 White Linens	4.50 @ 5.00
No. 4 White Linens	2.25 @ 2.50
No. 1 White Cotton	4.25 @ 4.75
No. 2 White Cotton	3.25 @ 3.75
No. 3 White Cotton	2.50 @ 2.75
No. 4 White Cotton	1.90 @ 2.15
Extra Light Prints	2.00 @ 2.25
Ord. Light Prints	1.75 @ 1.85
Med. Light Prints	1.55 @ 1.65
Dutch Blue Cottons	2.25 @ 2.50
French Blue Linens	3.50 @ 4.00
German Blue Linens	2.50 @ 2.75
German Blue Cottons	2.00 @ 2.25
Checks and Blues	2.00 @ 2.25
Linsey Garments	2.15 @ 2.25
Dark Cottons	1.90 @ 2.10
Old Shopperies	1.75 @ 2.00
New Shopperies	1.75 @ 2.00
French Blues	2.25 @ 2.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—	
Foreign	2.10 @ 2.15
Domestic	1.75 @ 1.85
Wool Tares, light	1.50 @ 1.75
Wool Tares, heavy	1.85 @ 2.05
Bright Bagging	1.70 @ 1.75
Manila Rope—	
Foreign	2.40 @ 2.60
Domestic	2.25 @ 2.50
Mixed Strings	1.10 @ 1.15
New Burlap Cut	2.75 @ 3.00
Hessian Jute Threads—	
Foreign	3.00 @ 3.25
Domestic	2.80 @ 3.00

Old Waste Papers

(F. o. b. New York)

Shavings—	
White Envelope Cuttings	2.55 @ 2.65
Ordinary Hard White No. 1	2.25 @ 2.35
Hard White No. 2	2.10 @ 2.20
Soft White No. 1	1.95 @ 2.05
Flat Stock—	
Stitchless	.65 @ .75
Over issue Mag	.65 @ .75
Solid Flat Book	.55 @ .60
Crumpled No. 1	.35 @ .40
Solid Book Ledger	1.50 @ 1.65
Ledger Stock	.85 @ .90
New B. B. Chips	.30 @ .35
Manilas—	
New Env. Cut	1.75 @ 1.85
New Cuttings	1.35 @ 1.45
Bogus Wrapper	.40 @ .50
Old Kraft Machine— Compressed bales	1.05 @ 1.30
News—	
No. 1 White News	1.15 @ 1.25
Strictly Overissue	.50 @ .60
Strictly Folded	.35 @ .40
No. 1 Mixed Paper	.30 @ .35

J. Andersen & Co.

Selling Agents

21 East 40th Street

New York

CHEMICAL & MECHANICAL PULP

Kraft Pulp

BERGVIK OCH ALA NYA AKTIEBOLAG
Söderhamn, Sweden
KALIX TRÄINDUSTRI AKTIEBOLAG
Vanaſjärden, Sweden
MUNKSUNDS AKTIEBOLAG
Munksund, Sweden
NENSJÖ CELLULOSA A.-B.
Sprängsviken, Sweden

Bleached Sulphite

KELLNER-PARTINGTON PAPER PULP CO., LTD.
Sarpsborg, Norway
Edsvalla, Sweden
Hallein & Villach, Austria

Unbleached Sulphite

AKTIESELSKABET GREAKER CELLULOSEFABRIK
Greaker, Norway
BERGVIK OCH ALA NYA AKTIEBOLAG
Söderhamn, Sweden
CELLULOSEFABRIKS A.-G.
Bratislava, Czecho-Slovakei
SVANÖ AKTIEBOLAG
Svanö, Sweden

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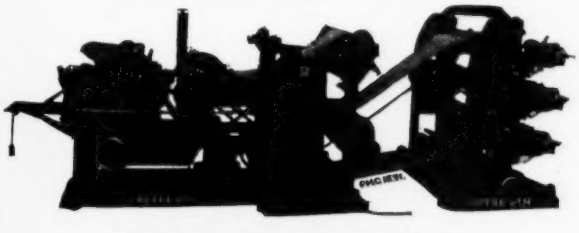

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OVER 850 BAGS PER MINUTE
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Twines

(F. o. b. Mill)

(Soft Fibre)

Coarse Polished—

India	.13¼	@	.15¾
Belg. White Hemp	.14¼	@	.17¾
India Compress	.13¾	@	.14¼

Fine Polished—

Fine India	.21½	@	.23½
Special	.19½	@	.21½

Unpolished—

Box	.12	@	.12½
Paper Makers	.09	@	.13½
Tube Rope	.10	@	.15½
Wall Paper	.11	@	.14½
Wrapping	.15½	@	.21
Special	.15	@	.15½
Soft Fiber Rope	.12½	@	.12¾

(Hard Fibre)

Bond	.09½	@	.18
Anchor	.09	@	.10½
Manila	.21	@	.28

CHICAGO

Paper

(F. o. b. Mill)

Rag Bond	.12	@	.40
Water Marked Sulphite Bond	.06¾	@	.11
Sulphite Bond	.05½	@	.07¾
Superfine Writing	.18	@	.24
No. 1 M. F. Book	.06½	@	.07¾
No. 2 M. F. Book	.05¼	@	.06¼
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¾	@	.06½
Coated Book	.07	@	.12
Coated Label	.07	@	.08½
No. 1 Manila	.04¼	@	.05¾
No. 1 Fibre	.04¾	@	.05¼
No. 2 Manila	.04¼	@	.04¾
Butcher's Manila	.03¼	@	.03¾
No. 1 Kraft	4.75	@	5.00
Southern Kraft	3.88	@	4.25
No. 2 Kraft	3.88	@	4.25
Wood Tag Boards	.04¼	@	.06¼
Sulphite Screenings	.03	@	.03¼
Manila Tissue	.05¾	@	.07
White Tissue	.07	@	.09

(Delivered Central Territory)

News, per ton—			
Rolls, contract	42.00	@	—
Sheets, open	47.00	@	—
Boards, per ton—			
Plate Chip	46.50	@	—
Solid News	50.00	@	—
Manila Lined Chip	55.00	@	—
Patent Coated	65.00	@	—
Container Lined—			
85 Test, per 1000 sq. ft.			1.70
100 Test, per 1000 sq. ft.			1.85

Old Papers

(F. o. b. Chicago)

Shavings—

No. 1 White Envelope Cuttings	1.70	@	2.00
No. 1 Hard White	1.40	@	1.65
No. 1 Soft White	1.25	@	1.50
Ledger & Writings	.60	@	.70
Solid Books	.50	@	.60
Blanks	1.00	@	1.05
Kraits	.80	@	.90
New Kraft Cuts	1.20	@	1.30
Manila Env. Cuts	1.25	@	1.30
Ex. No. 1 Manila	.90	@	1.00
Print Manila	.40	@	.50
Overissue News	.40	@	.45

Old Newspapers—

No. 1 Folded News	.42½	@	.45
No. 1 Mixed Paper	.25	@	.30

Roofing Stocks—

No. 1	30.00	@	—
No. 2	28.00	@	—

PHILADELPHIA

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, M. F.	5.00	@	—
Book, S. S. & C.	5.25	@	—
Book, Coated	6.15	@	—
Coated Lithograph	6.15	@	—
No. 1 Jute Manila	10.50	@	—
Manila Sul., No. 1	6.75	@	—
Manila No. 2	4.25	@	—
No. 1 Kraft	6.00	@	—
Southern Kraft	5.00	@	—
News Print Rolls	40.00	@	—
Straw Board	40.00	@	45.00
News Board	40.00	@	—
Chip Board	37.50	@	—
Wood Pulp Board	70.00	@	85.00
Binder Boards—			
No. 1, per ton	75.00	@	80.00
No. 2, per ton	70.00	@	75.00
Carload lots	65.00	@	70.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.08	@	.08½
New White, No. 2.	.04½	@	.05
Light Silesias	.05½	@	—
Silesias, No. 1	.04½	@	.05
Black Silesias, soft	.03½	@	.04
New Unbleached	.06	@	—
Washable, No. 1	.02	@	.02½
Blue Overall	.06	@	.06½
Cottons—According to grades—			
Washable, No. 2	.02½	@	.04½
New Blue	.01¾	@	.02¾
Fancy	.03	@	—
New Black Soft	.04	@	.04½
New Light Seconds	.03½	@	.04
New Dark Seconds	1.75	@	2.00
Khaki Cuttings—			
No. 1 O. D.	.04	@	.04½
No. 2 Mixed	.03½	@	.04
Corduroy	.02	@	.02½
New Canvas	.04	@	.04½
New Black Mixed	.02	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	4.00	@	4.50
Miscellaneous	3.00	@	3.50
Thirds and Blues—			
Miscellaneous	2.00	@	—
Repacked	2.25	@	2.50
Black Stockings (Export)	4.50	@	5.00
Roofing Stock—			
Foreign No. 1	2.20	@	2.25
Domestic No. 1	1.50	@	—
Domestic No. 2	1.40	@	—
Roofing bagging	1.10	@	—

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	2.00	@	—
Domestic	2.25	@	—
Manila Rope	2.25	@	2.50
Sisal Rope	2.00	@	2.25
Mixed Rope	1.00	@	1.10
Scrap Burlaps—			
No. 1	2.00	@	2.50
No. 2	.90	@	1.00
Wool Tares, heavy	3.00	@	3.25
Mixed Strings	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.50	@	2.75

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.30	@	2.40
No. 2 Hard White	2.10	@	2.20
No. 1 Soft White	1.80	@	1.85
No. 2 Soft White	1.40	@	1.45
No. 1 Mixed	—	@	.85
Solid Ledger Stock	1.50	@	1.60
Ledger Stock, white	1.15	@	1.20
Ledger Stock, colored	.85	@	.90
No. 1 Books, heavy	.65	@	.70
Manila Cuttings	1.80	@	1.90
Print Manila	.50	@	.60
Container Manila	.50	@	.60
Kraft Paper	1.10	@	1.20
No. 1 Mixed Paper	.35	@	.40
Straw Board Chip	.40	@	—
Binders Board Chip	.40	@	—
Corrugated Board	.60	@	.65
Overissue News	.60	@	—
Old Newspapers	.40	@	—

BOSTON

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13¼

Sulphite Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.50	8.50
No. 2 Sulphite	6.50	7.50
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¾	@	.06¼
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.04¼	@	—
No. 2 Kraft	.04¼	@	—

(Delivered New England points)

Southern Kraft	.04	@	—
News Print Rolls	39.50	@	—
Straw Board, rolls	.009	@	35.00
Filled News Board	40.00	@	45.00
Chip Board	37.50	@	40.00
Single Manila Lined Chip	47.50	@	52.50
Single White, Patent Coated News Board (Bender)	55.00	@	65.00
Wood Pulp Board	70.00	@	75.00
Binder Boards (Standard Grade)	67.00	@	75.00

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.00	@	2.10
No. 1 Soft White	1.75	@	1.85
No. 2 Mixed	.75	@	.80
Solid Ledger Books	1.50	@	1.75
Overissue Ledger Stock	1.15	@	1.30
Mixed Ledgers	.85	@	.90
No. 1 Books, heavy	.60	@	.70
No. 1 Books, light	.50	@	.60
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.50	@	1.60
No. 1 Old Manila	.60	@	.65
White Blank News	1.10	@	1.15
No. 1 Kraft	1.05	@	1.12½
Mixed Papers	.32½	@	.35
Print Manila	.47½	@	.50
Container Manilas	.27½	@	—
Old Newspapers	.32½	@	.35
Overissue News	—	@	.40
Box Board Chips	—	@	.25
Corrugated Boxes	.47½	@	.50
Kraft corrugated boxes	.95	@	1.00
Screening Wrappers	.40	@	.45

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.35	@	2.45
Domestic	2.25	@	—
Transmission Rope	1.20	@	1.30
Jute Rope	1.90	@	2.10
Jute Carpet Threads	1.00	@	1.10
Gunny No. 1—			
Foreign	1.90	@	2.00
Domestic	1.75	@	1.80
Bleachery Burlap	4.25	@	4.50
Scrap Burlap—			
Foreign	1.90	@	2.00
Domestic	1.60	@	1.75
Scrap Sisal	1.90	@	2.00
Scrap Sisal for Shredding	2.10	@	2.25
Wool Tares, heavy	1.90	@	2.00
New Burlap Cuttings	2.00	@	2.25
Australian Wool Pouches	2.25	@	2.35
Heavy Baling Bagging	1.75	@	2.10
Paper Mill Bagging	1.65	@	1.70
Bagging No. 2	1.10	@	1.25

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.01¾	@	.02
New White No. 1	.07	@	.07½
New White No. 2	.04	@	.04½
Silesias No. 1	.05	@	.05½
New Black Silesias	.03½	@	.04¼
Soft Unbleached	.07¼	@	.07¾
Blue Cheviot	5.50	@	6.00
Fancy	.02½	@	.02¾
Washable	.0165	@	.0170
Cottons—According to grades—			
Blue Overalls	5.50	@	6.00
New Black, soft	.04	@	.04¼
Khaki Cuttings	.04	@	.04¼
O. D. Khaki	.03¾	@	.04¼
Corduroy	.01¾	@	.02
New Canvas	—	@	.05
B.V.D. Cuttings	—	@	.06¼

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.75	@	2.00
Thirds and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings	3.90	@	4.00
Roofing Stock—			
No. 1	1.30	@	1.40
No. 2	1.20	@	1.25
No. 3	—	@	1.15

Foreign Rags

(F. o. b. Boston)

Dark Cottons	1.50	@	1.70
New White Shirt Cuttings	6.50	@	6.75
Dutch Blues	2.25	@	2.50
New Checks & Blues	2.50	@	3.00
Old Fustians	1.75	@	1.90
Old Linsey Garments	1.75	@	2.00
New Silesias	5.00	@	5.75

TORONTO

Paper

(F. o. b. Mill)

Bond—			
No. 1 Sulphite	.11	@	—
No. 2 Sulphite	.08½	@	—
No. 1 Colored	.12	@	—
No. 2 Colored	.09	@	—
Ledgers			
Ledgers, No. 1	.34½	@	—
Ledgers, No. 2	.25½	@	—
Writing	.09	@	.09½
Book—			
No. 1 M. F. (Carloads)	6.50	@	—
No. 2 M. F. (Carloads)	6.00	@	—
No. 3 M. F. (Carloads)	6.00	@	—
No. 1 S. C. (Carloads)	7.00	@	—
No. 2 S. C. (Carloads)	6.50	@	—
No. 3 S. C. (Carloads)	6.50	@	—
No. 1 Coated and Litho	12.00	@	—
No. 2 Coated and Litho	10.50	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown	4.75	@	—
White Wrap	3.50	@	—
"B" Manila	4.80	@	—
No. 1 Manila	5.40	@	—
Fiber	5.40	@	—
Kraft, M. F.	5.90	@	—
Kraft, No. 2	5.40	@	—

(F. o. b. Cars Toronto)

News, per ton—			
Rolls (contract)	40.50	@	—
Sheets	45.00	@	—

Pulp

Ground wood	27.00	@	—
Unbleached Sulphite	42.00	@	—
Book (Class 1)	58.00	@	—
Writing (Class 2)	59.00	@	—
Select (Class 3)	60.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	2.00	@	2.25
Soft White	1.60	@	1.90
White Blk. News	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	.80	@	.90
Light and Crumpled Book Stock	.70	@	.80
Ledgers and Writings	.90	@	1.00
Manilas—			
New Manila Cut	1.25	@	1.40
Printed Manilas	.50	@	—
Kraft	1.00	@	1.60
News and Scrap—			
Strictly Overissue	.55	@	—
Strictly Folded	.50	@	—
No. 1 Mixed Paper	.40	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.07½	@	.07¾
Fancy Shirt Cuttings	.02¾	@	.03